Cover: *"TIBETAN SKY,"* by Philip Lieberman, the Fred M. Seed Professor of Cognitive and Linguistic Sciences at Brown University, and a professional photographer.

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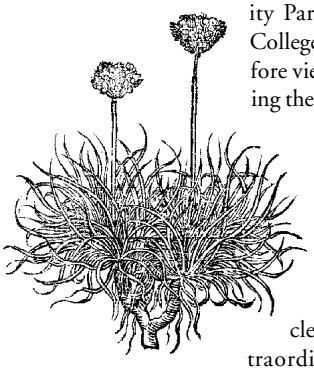
COMMENTARIES

Winning the Battle but Losing the War: Asthma 1999

On the Cover: Philip Lieberman's *"TIBETAN SKY"* showcases air unpolluted by industry, by vegetation, by people. In the past, asthmatics sought out "pure" air. Today scientists recognize that air pollution per se does not cause asthma, that the linkage between the offending particles in the air and asthma is more subtle.

Sketches throughout the issue are of the ragweed, grasses, and animals that often trigger asthma attacks.

This issue of *Medicine & Health/Rhode Island* devoted to asthma underscores the importance of joint ventures, such as this journal, in bringing together medical and public health issues. This journal is subsidized by the Rhode Island Medical Society, the Department of Health, Brown University, Rhode Island Quality Partners, and the American College of Physicians and therefore views its mission as forwarding the causes of basic and applied medicine, public health and quality care. Asthma is an illness that spans these interests and illustrates the importance of their integration. The articles in this issue make clear that we are in the extraordinary position of understanding asthma better, treating individual cases more effectively, yet finding ourselves overwhelmed by an ever-increasing disease burden. Why this is happening is unclear although many facts are known. Poverty, in some manner, appears to be a major link to this increase but certainly is only part of the explanation. The poor are no poorer now than they used to be and overcrowding is also probably not a whole lot worse than 20-50 years ago. The middle class has seen an increased burden as well. The information in this issue states that air pollution, which would be an easy explanation, is not the answer either.



Whatever the etiology is for this developing crisis, public health, in concert with molecular biology, immune modulation and pulmonary pharmacology, will provide the solution. And, as the case of baby Jose, detailed in Dr. Martin's report, demonstrates, the "ideal" treatment is often not possible for the poor and uneducated, who make up a disproportionate share of the afflicted.

Political will is what we need. If, in this time of unprecedented prosperity, we cannot solve this problem, when will we?

– Joseph H. Friedman, MD

Poverty, the Stepmother of Genius

And old saying declares that the child is father to the adult; that in each child one can detect the rudimentary characteristics and framework of adult accomplishment. Perhaps. But consider the wretched childhood of a boy named for his patron, St. James, and behold then his maturity.

James was born in 1852 in the wretched Aragonese hilltop village of Petilla, a collection of some sixty rude, unadorned houses clinging to the north face of an inhospitable mountain in northern Spain. The only amenity in town was its small church. The annual weather was described as consisting of nine months of winter and three months of hell.

Jim's father was a meagerly educated, itinerant barber-surgeon, a man of indominable spirit, as inflexibly harsh as Petilla's weather. He managed to teach young Jimmy some meager elements of arithmetic and geography. But in his diary he described his son as "a wayward creature, excessively mysterious and unlikeable."

The first 16 years of Jimmy's life consisted of an unending contest of wills between father and son. By age 7 Jim was an accomplished delinquent and a lonely wanderer through the neighboring mountain passes. His life was a succession of vandalism, petty thievery, truancy, beatings and scholastic failures.

In his later writings, Jim recalls only one memorable childhood event: the solar eclipse of 1860. It was not the eclipse itself but rather the astonishing capacity of scientists to have known precisely when this event was to occur. He saw this, in retrospect, as his private epiphany, a greater miracle than all those recorded in his catechism.

At age 9 Jim was shipped away to a private school for wayward boys. There he was converted from a morbid, inarticulate introvert to a proficient leader of juvenile criminals. His father then brought him to the ancient town of Jaca, to a disciplinary institution with a remorseless motto: "Knowledge enters only with pain." Jim's stay in Jaca was marked by corporal punishment, privation, solitary confinement and periodic starvation. In his

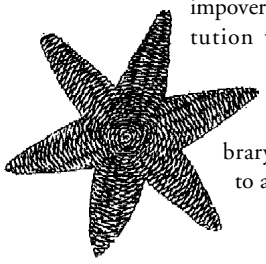
isolation, however, he learned to sketch using bits of charcoal and fragments of cigarette paper.

In his eleventh year, Jim managed to construct a cannon, destroying the wall of a neighbor's house. Spain recognized no extenuating circumstances for minor offenders and accordingly Jim was consigned to civil jail, and after a few months shipped away to a reformatory for incorrigibles in Huesca, the city of El Cid. His transfer documents described him as implacably hostile, refractory and antisocial.

Largely through the pleadings of his aggrieved mother, Jim was allowed to be apprenticed to a shoemaker. And while this too proved to be a failure, a chastened adolescent nonetheless managed to attend class for an entire year without any major incident. The Huesca Institute was an authoritarian academy which proclaimed three major evils: rationalism, individual judgment and the writings of Voltaire.

Jim's father had improved his personal station in life. He was now employed by the anatomy professor at Zaragossa University to prepare anatomic dissections. And after all these years of willful conflict, father and son finally discovered some common ground. They jointly labored upon anatomic dissections which Jimmy sketched with exquisite accuracy.

After a year, Jim was permitted to enroll in the medical school. It was an impoverished institution without a single laboratory and a library confined to a corner alcove. Any research was regarded with deep suspicion and the germ theory of disease was summarily rejected.



At age 21 Jim was awarded a licentiate as a physician and surgeon but could find no civilian post. He was then obliged to enter the Spanish army as a field surgeon. The year was 1874 and one of Spain's last colonies, Cuba, was in active revolt and most of the Spanish army had been dispatched to this disease-wracked island. In a decade of attempted pacification, many thousands of Spanish soldiers had died of malaria, yellow fever, dysentery and gunshot wounds. Jimmy labored for two debilitating years as an infantry physician in one jungle encampment after another. He was repeatedly infected with malaria and intestinal parasites. And only after he developed tuberculosis was he finally repatriated to Spain, a malnourished, dispirited veteran, scarcely 24 years old and weighing less than 105 pounds. It required two years in a nursing facility before he could resume work in medicine.

Hardly an auspicious beginning: A refractory, hostile child barely surviving to adulthood; poorly educated in a marginal medical school; divorced from any scholarly activity for four years; profoundly ill, melancholic, periodically belligerent, withdrawn and bereft of social graces; and without job opportunities or professional sponsorship. Jimmy returned to his old job as a laboratory assistant at Zaragossa University investing his entire veteran's pension in the purchase of a new instrument called a microscope. Six years later he accepted a teaching post in Valencia, thence Barcelona and finally, to Madrid where he lived the remainder of his enormously productive life. He died in 1934, beloved by Spain, and honored and cherished by the entire scientific world.

Who was Jimmy? or St. James ? Or, in Spanish, Santiago? He was Don Santiago Felipe Ramon y Cajal, the greatest of Spanish scientists, a man whose professional life had been devoted to a rigorous study of the structure and functioning of the vertebrate nervous system. Through six decades of scientific labor, he had converted the central nervous system from three pounds of mystery to an understandable organ compliant with the rules of general physiology. His research founded the sciences of neurohistology and fundamental neurophysiology. He was the prime teacher of a generation of neuroscientists; and there was not a major city in the Hispanic world that did not have a boulevard or park named in his honor. In 1906 he was awarded the Nobel prize.

Where in Cajal's sociopathic childhood can one find the latent seeds of his genius ? Certainly no one claims that delinquency heralds scientific accomplishment; but adversity in some does result in greater introspection. And just as early poverty may lead to a deeper respect for the material aspects of life, so too a wasted childhood might become a compelling incentive for a lifetime of rigorous study. And perhaps learning to doubt before learning to believe might be an added stimulus to generate new, even heretical, ideas in science.

– Stanley M. Aronson, MD

THE TAPESTRY OF MEDICINE

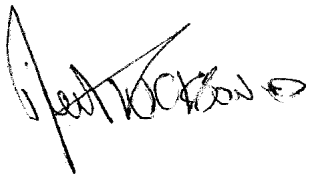
STANLEY M. ARONSON, MD, neuropathologist, founding dean of the Brown University School of Medicine, and editor emeritus of *Medicine & Health/Rhode Island*, has been sharing his wit and wisdom with thousands of Rhode Islanders through weekly columns in the *Providence Journal*, and monthly commentaries in *Medicine & Health/Rhode Island*. The just-published book, *The Tapestry of Medicine* (Manisses Communications Group), gathers 73 of those essays. Proceeds will go to the Brown University Medical School. To order a copy, contact the publisher, phone: (800) 333-7771; fax: (401) 861-6370.

Introduction to Special CME Issue: Asthma

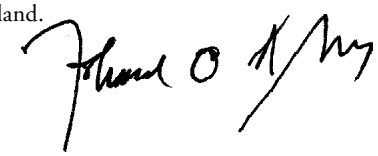
We are pleased to welcome you to this special asthma issue of *Medicine & Health/Rhode Island*, the result of a unique collaboration between the Rhode Island Medical Society and the Rhode Island Public Health Association. With hospitalization rates on the rise and a disproportionate disease burden among low-income minority communities, asthma has emerged as a key health challenge for Rhode Island health professionals. In response, the Medical Society and the Public Health Association, champions in their respective fields in advocacy and action for the health of the people of Rhode Island, have pooled their resources and talents for the first time to produce a journal focused on the clinical and public health aspects of asthma.

A special Advisory Board, co-chaired by Dr. Charles Sherman of The Miriam Hospital Pulmonary Division and Dr. Patricia Nolan of the Rhode Island Department of Health, and consisting of health care professionals and community representatives with expertise and experience in asthma, has been instrumental in assisting the journal's Editorial staff in the selection of the topics for this issue. Readers will be challenged to conceptualize asthma not as merely a disease impacting the individual patient, but as a health issue within a broader family, community, and environmental context.

This project has been supported through the *Cooperative Actions for Health Program* (CAHP), a collaborative grant project co-sponsored by the American Public Health Association and the American Medical Association, with funding from The Robert Wood Johnson Foundation. As leaders in CAHP and in the National Medicine/Public Health Initiative, we believe that collaboration between medicine and public health is essential for improving the health of the people we serve, as individuals and as communities. We congratulate the Rhode Island Medical Society and the Rhode Island Public Health Association for this landmark collaborative effort, the first step, we believe, in an on-going relationship in service for the health of the people of Rhode Island.



Reed V. Tuckson, MD
Senior Vice President for Professional Standards
American Medical Association



Mohammad N. Akhter, MD, MPH
Executive Director
American Public Health Association

Asthma: Profile of an Epidemic

Charles Sherman, MD, MPH

Incidence:

Age	1980	1993-94
newborn to age 4	42.8/1,000	74.4/1,000
ages 4-14	30.7	53.8
all ages	22.2	57.8
Race		
black	34.0	57.8
white	30.4	50.8
other	22.5	48.6
Mortality by race		
black	4.20	3.85
white	2.66	1.51
other	2.57	1.77

Prevalence:	1975	1993-95
people who went to MD for asthma	4.6 million	10.4 million
	1980	1998
people who self-report with asthma	6.8 million	17.3 million

Cause for Increase: Not definitively known

Hypothesized Causes:

* Changes in diagnostic reporting: today persistent respiratory distress (pediatrics) and chronic obstructive pulmonary disease (adults) may be more often diagnosed as asthma
* Genetics: today more people may have genetic predispositions
* Environmental factors: changes in both indoor and outdoor allergens, irritants, and pollutants have been linked to asthma increases

Triggers/Irritants:

1. allergens, such as cats, dogs, mites, cockroaches, grain, mold, and pollen
2. cigarette smoke
3. respiratory infections
4. exercise
5. fumes from cleaning solvents and other chemicals
6. allergies to specific foods and medications (e.g., aspirin and advil)

Cure: None

Treatment: Managing the Disease

Patients manage the disease by:

* avoiding triggers where possible
* monitoring symptoms
* taking medication as prescribed
* hyposensitization to specific allergens, if identified

Medications:

*Controller medications:

1. inhaled steroids
2. cromolyn and nedocromil
3. long-acting $beta_2$ agonists
4. leukotriene modifiers (approved by the FDA since 1997)

* Quick relief medications

1. $beta_2$ agonists
2. anti-cholinergics

Environmental:

* reducing household contaminants ("cleaning" to reduce exposure to asthma is similar to "cleaning" to reduce exposure to lead)

Source of Numbers: Centers for Disease Control

This issue, funded by the Robert Wood Johnson *Cooperative Actions for Health Program* (CAHP) grant, offers Rhode Island clinicians a collection of papers that present asthma from a public health vantage - seeing it not as a single clinical incidence for one patient, but as a population hazard.

Patricia Nolan, Director of the Department of Health and my co-editor, discusses the dilemma of reporting: on the one hand, to document the epidemic, the country's public health departments need consistent uniform data. Today's pastiche from insurers' bills, hospital discharges, school absentee records, and patients' self-reports tracks the rising incidence/prevalence, but gives epidemiologists weak benchmarks. On the other hand, making asthma reportable means setting clear diagnostic criteria, and deciding who will pay for the costs of reporting. Although the Centers for Disease Control has recommended against making asthma reportable, as Patricia Nolan explains, it may be time to reconsider that recommendation.

The management of asthma (self-management plan, instructions as to monitoring, medications, environmental triggers) begins in the physician's office. I condense the NIH guidelines (1991 and 1997 editions) into a useful template for physicians who must launch patients into a rigorous regimen of management in only 2 to 3 visits. Primary care physicians, however, confront patients who may believe that their wheezing denotes asthma, but who don't in fact have asthma. Michael Fine discusses the difficulties of diagnosis in primary care practice.

Medications are central to the control of asthma, but we have no

clear-cut magic bullets that will work for all patients at all times. Mary Ann Passero, a pulmonologist at Rhode Island Hospital, and David Chronley, a pediatrician in South County, recreate the conversation about inhaled steroids in pediatrics that the spurt of new studies has raised. The leukotriene modifiers are the first new class of drugs approved by the FDA for asthma in 20 years. Cynthia Wedekind, from the University of Rhode Island's College of Pharmacology, discusses this new medication, approved by the FDA for the past 2 years, and now prescribed for the most part for adult patients.

For pediatric patients, the child's pediatrician is a (hopefully) rare figure in the child's life, seen occasionally. The teacher, though, sees the child 180 days (again hopefully) a year; and the school nurse can be an ally, helping the child monitor symptoms, recognize attacks, and take medication. Indeed, the NIH has explicitly recommended a school monitoring plan. Ann Kelsey Thacher and Rosemary Reilly-Chammat, from the Department of Health, describe school policies (for instance, since 1998 children can carry inhalers to school; smoking is barred at all school events, even those off-site), and suggest ways physicians can work with school nurses.

Physicians can also work with community "asthma" organizations. Patients and families will need intensive education (anecdotal evidence suggests that many patients use peak flow meters incorrectly, that they discard inhalers and stop taking their medication, that they overlook key symptoms). Betina Ragless, from the American Lung Association of Rhode Island, lists the educational initiatives happening in the community. And since patients are increasingly prone to seek information, advice, and support in the virtual community, a table lists some asthma-related web sites.

The triggers to attacks are based in the environment. Robert Vanderslice and Lynn Bibeault, from the Health Department, summarize relevant "clean environment" legislation, and describe several local housing initiatives. Since asthma disproportionately affects inner-city, particularly minority children, and since those children often

live in substandard rental housing, the campaign to reduce environmental triggers segues into campaigns to improve housing (including the reduction of lead-based paint), to increase poor children's access to consistent health care, to reduce poverty. Bruce Kogan, from Roger Williams Law School, gives insight into the rights, and the dilemmas, of the worker with asthma, under the Americans with Disabilities Act.

For a population, the impact of asthma can be measured in mortality and morbidity statistics. Jay Buechner, from the Health Department, summarizes recent data, which overall show asthma-related mortality declining in the past decade, and asthma-related morbidity remaining stable.

Finally, for an individual, the impact of asthma translates into suffering. Carla Martin, a resident at Hasbro Hospital, presents a case that weaves all the social ills that make management of asthma so difficult: poverty, poor housing, transiency, unstable - if not abusive - family relationships. The toddler, with a genetic history of asthma, has a sibling with recurrent respiratory infections. If this issue ultimately helps those patients, the grant money will be well-used.

Acknowledgement

This issue was a collaborative endeavor, beginning with the partnership of the Medical Society and the Rhode Island Public Health Association, which jointly received a *Cooperative Actions for Health Program* grant. The Continuing Medical Education advisory committee oversaw the delineation of objectives and the selection of articles. I thank those members: Patricia Nolan, MD, Celia Gomes-McGillivray, MPH, the president of the Rhode Island Public Health Association; Joan Retsinas, PhD, managing editor, *Medicine & Health/Rhode Island*, Barbara Niekerk, MEd, Director of Continuing Medical Education at Brown University School of Medicine, Edward Westrick, MD, from the Rhode Island Quality Partners; William Corwin, MD, from Harvard Pilgrim Health Plan, Stanley Bloch, MD, from the Providence Ambulatory Health Center, Carla Martin, MD, and Ersilina Bencosme, MD, from Rhode Island Hospital, Jeffrey Newell, DPharm, from CVS-Health Care Services, and Toby Liebovitz, a parent-teacher-advocate.

Charles Sherman, MD, MPH, is a an Associate Professor, Brown University School of Medicine, and co-guest-editor of this issue.

Should Childhood Asthma Be Reportable?

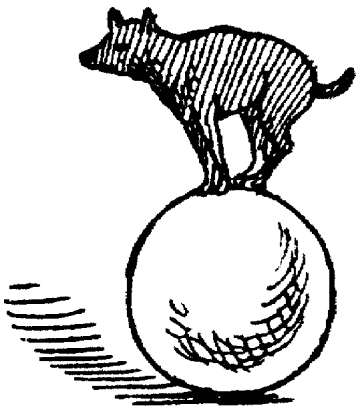
Patricia Nolan, MD

Asthma in childhood is an important health problem. It disrupts school and play. It causes illness and even death. It costs a substantial amount in health care dollars. It interferes with our children reaching their full potential. And many of its negative effects can be prevented.

Our public sources of information about morbidity and mortality are *ad hoc* sources: hospital discharge data and death certificates to confirm the worst effects of asthma, anecdotal or case-by-case data to assess the breadth of effects in the population. (Private managed care organizations do track asthma among their enrollees, but don't generally share that data with the public.) The gradation of the severity of asthma reflects clinical concerns, but is hard to translate into incidence and prevalence data. The lack of consistency in definitions of clinical severity, incidence, and prevalence makes it more difficult to identify modifiable factors to reduce asthma morbidity. The same lack of clarity has limited our ability to measure the impact of strategies we initiate.

Would making asthma reportable help us identify modifiable factors and begin to reduce the adverse effects of asthma?

Making asthma reportable could lead to agreed-upon criteria of severity for epidemiologic purposes, and that alone is useful. Reporting provides a basis for defining an asthma "event". Reporting is only a starting point, however, and must be supported by investigation and analysis resources. If supported, reporting opens a surveillance system with the capacity to study incidence, prevalence, and modifiable factors over time. Using a common set of criteria, we are able to compare incidence and prevalence across time, among geographic areas, demographic groups (age, race-ethnicity, gender), socio-economic groups, and among states. Local data on severity levels and risk factors can be clarified, and long term prevention goals can be set realistically and then measured.



An alternative to reporting in the "infectious disease" model is registry development, a method of surveillance more commonly used for chronic illnesses such as cancers. The investment in a registry may be larger, because there is more emphasis on tracking individual outcomes over time.

Either a reporting or a registry system would enhance our understanding of childhood asthma and our accountability for interventions. Full value of surveillance requires turning information around and assuring that families and physicians know what the data show. The sharing of data across insurers, providers and even state lines is difficult. A surveillance system at the state level can protect confidentiality and yet share important data.

Without population-based surveillance, we are working in the shadows, trying to solve a major public health problem whose dimensions we cannot really see.

The Centers for Disease Control and Prevention have not promoted reporting of childhood asthma. They have funded surveillance projects in several states and cities, using emergency room visits as a critical factor. While a useful strategy, emergency room visits are only a part of the spectrum of this important condition, but a good reflection of strategies to reduce emergency room use.

There is interest in establishing a non-governmental registry for asthma, but the potential for competing registries is high. Health plan disease management protocols may collect the essential information, but they are hindered by the movement of enrollees among plans. Sharing information between plans is hindered by confidentiality and competition concerns. Competing registries and health plans require a central repository to achieve population-based surveillance. Otherwise we cannot tell if we are over-counting or under-counting morbidity.

It will require an investment by state government and health care providers, and insurers, but it is time to make asthma a reportable condition. Without population-based surveillance, we are working in the shadows, trying to solve a major public health problem whose dimensions we cannot really see.

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Office Management of Asthma

Charles Sherman, MD, MPH, and Darlene Arthurs, RN

Asthma is a chronic illness characterized by airway inflammation, partially reversible air flow obstruction and increased airway responsiveness. It affects almost 15 million people in the United States and is the most common chronic illness of childhood.[1,2] Asthma prevalence and incidence have increased over the last 20 years. Individuals with asthma account for more than 100 million days of restricted activity and 470,000 hospitalizations per year. Each year 5,000 people die from their asthma. Blacks, aged 15-24 years, are the most likely to die from their disease.[3] As can be appreciated, the diagnosis and management of asthma are of paramount importance for all health care providers.

To help educate physicians throughout the country, an expert panel convened by the National Institutes of Health produced *Guidelines for the Diagnosis and Management of Asthma* in 1991 [4] and an updated version in 1997.[5] These clinical guidelines emphasized four main components in effective management: objective measures of lung function, environmental control measures, comprehensive pharmacologic therapy, and patient education. The guidelines have provided a wealth of information for physicians caring for asthmatics, whether they be children, adults or the elderly. Despite widespread distribution of the expert panel reports, physicians in practice have found them difficult to apply. Large numbers of outpatient visits and time restraints for patient education have been identified as barriers to implementing the guidelines. Further, the guidelines do not provide a usable format for individual patient visits. This article seeks to provide clinicians with a practical approach to the diagnosis and management of asthma, incorporating the expert panel's guidelines into office practice.

Despite widespread distribution of the expert panel reports, physicians in practice have found them difficult to apply.

What follows is a detailed description of what should occur during the initial office visit and the two follow-up visits, allowing an expedient diagnosis of asthma and optimal management of the disease (Figure 1).

During the first office visit, several important goals need to be achieved. The diagnosis of asthma must be confirmed and the patient needs to be instructed in using a peak flow meter and recording a daily symptom diary. (Patients are given a daily diary to complete). In addition, the patient (and/or parent) must understand their medications: proper dosage, possible side-effects, ramifications of a missed dose.

Because the 30-40 minute visit does not allow time for much discussion, the clinician should give the patient (parent) questionnaires before the visit. (Admittedly, patients with low levels of literacy may gain little, if not be deterred, by written questionnaires; those patients will need additional oral instructions.) (Center insert #1). This questionnaire should not only list a variety of symptoms suggestive of asthma, but include the pattern of symptoms, and precipitating and/or aggravating factors for the symptoms. Questions on the family and social history including items on smoking, home environment and social factors that may interfere with adherence to a management plan must also be included. The symptoms most characteristic of asthma are cough, which is worse at night, recurrent wheezing, recurrent difficulty in breathing and recurrent chest tightness. These symptoms are usually worse in the presence of exercise, viral infection, exposure to animals with furs or feathers, mold, smoke, pollen or changes in the weather. Symptoms that occur at night are particularly worrisome.

If the patient has symptoms suggestive of asthma, then pulmonary function testing is necessary to confirm the diagnosis. Spirometric measurements before and after the patient takes a short-acting bronchodilator must be undertaken. A 15% increase in FEV_1 and FVC and/or a 25% increase in FEF25-75 are supportive of reversible air flow obstruc-

Figure 1:
Goals of Initial and Follow-up Visits for Asthma Management

Initial Visit
1. Confirm Diagnosis
   a. History
   b. Physical Exam
   c. Spirometry
2. Start Appropriate Medications
3. Patient Education
   a. Use of Peak Flow Meter
   b. Completion of Daily Symptoms/ Peak Flow Diary
   c. Medication Effects and Side Effects

1st Follow-up Visit (2 weeks)
1. Review Daily Symptoms/Peak Flow Diary
2. Review Medication Use and Delivery Technique
3. Medication Adjustment
4. Patient Education
   a. Warning Signs of Exacerbation
   b. Trigger Control

2nd Follow-up Visit (6 weeks)
1. Review Daily Symptoms/Peak Flow Diary
2. Review Medication Use and Delivery Technique
3. Medication Adjustment
4. Patient Education
   a. Asthma Management Plan

tion. Peak flow measures, although important in monitoring treatment, are not useful in the initial diagnosis of the disease. Bronchoprovocation with methacholine may be necessary if spirometry is normal or near normal, but the patient has symptoms suggestive of asthma. Adolescents and school-age children may be best tested in a laboratory familiar with evaluating children in this age group. Chest x-rays are rarely necessary other than to exclude other diagnoses.

Several other diseases must be considered. In children, the clinician should rule out upper airway diseases (allergic rhinitis and sinusitis), obstruction involving the large airways (foreign body in the trachea or bronchus), vocal cord dysfunction, or obstruction involving smaller airways (viral bronchiolitis or obliterative bronchiolitis, cystic fibrosis, bronchopulmonary dysplasia, heart disease). In adults, chronic obstructive pulmonary disease, congestive heart failure, pulmonary edema, pulmonary embolus, mechanical obstruction of the airways, pulmonary infiltrates with eosinophilia, cough secondary to drugs, and vocal cord dysfunction may mimic asthma. A careful history is useful in eliminating these other possibilities.

… the goals of the initial visit are to confirm the diagnosis, to educate the patient (and/or parent) on using the peak flow meter and their medications, and convince the patient (and/or parent) to keep a daily diary.

After quickly establishing the diagnosis during the first part of the initial visit, patient education is the next important part of the visit. The patient (and/or parent) must be instructed on using a peak flow meter to assess air flow each day and at different times during the day. The patient (and/or parent) also needs to be educated on how to use appropriate medications with a holding chamber. This information will be recorded on the daily diary over the next two weeks (Center insert #2. The diary information will eventually be used to characterize the patient as having mild intermittent asthma, mild persistent disease, moderate persistent disease, or severe persistent disease (Figure 2). This characterization is important as stepwise therapy is recommended based on the severity of disease (Figure 3).

It is important to emphasize that physical exercise should be encouraged for all asthmatic children.

At the end of the visit, the clinician should give the patient (parent) additional written materials on medications, peak flow meters, and the diary.

Thus, the goals of the initial visit are to confirm the diagnosis, to educate the patient (and/or parent) on using the peak flow meter and the medications, and convince the patient (and/or parent) to keep a daily diary.

A follow-up visit should occur in two weeks. In the waiting room, the patient (and/or parent) should complete a follow-up questionnaire (Center insert 3). At the time of the visit, the clinician should review the daily diary for respiratory symptoms, peak flow and any adverse effects to medications. The patient (and/or parent) should also be questioned about any missed work or school, any reduction in usual activities, and any disturbance in sleep due to asthma. Adherence to the medication regimen, inhaler technique, the frequency of use of each medication, and side effects of medication should be ascertained. Spirometry should be repeated. Based on the patient's reported symptoms and spirometry measures, the clinician may adjust medication. (Center insert 4) The patient (and/or parent) should then be given information on warning signs of asthma episodes, managing trigger control and information on when to stay home and when to go to the Emergency Room.

A third visit should occur in six weeks. Again, the daily diary should be assessed for changes in symptoms. Spirometry should again be performed. Patient (and/or parent) teaching should be reinforced on the proper technique of peak flow and medication usage including the holding chamber. Direct observation of these skills is an excellent method of assessment. Based on spirometry and the respiratory symptoms, the clinician should again adjust medication. (Center-insert #4) In this third visit, formalization of the self-management plan should be done. The patient (and/or parent) should have a good knowledge of his/her symptoms and triggers. The patient (and/or parent) should also understand how to determine when to stay home and when to go to the Emergency Room. The patient (and/or parent) should understand the medications and their side effects. The patient (and/or parent) should demonstrate knowledge of the basic facts about asthma and show skill in using the inhaler holding chamber and the peak flow meter. The patient should have a formal asthma management and action plan at the end of this visit. Adolescents and older school-age children should be directly involved in setting therapeutic goals and devising the individual asthma management plan. A copy of the written asthma management plan should be given to the appropriate school representative. It is important to emphasize that physical exercise should be encouraged for all asthmatic children.

At all subsequent visits, the clinician should reassess the patient's symptoms, peak flows, quality of life and knowledge of disease. The patient (and/or parent) should establish treatment goals; e.g., being free from severe symptoms day and night, having the best possible lung function, being able to participate in any activity of choice, not missing work or school because of asthma symptoms, not needing

FIGURE 2 Stepwise Approach for Managing Asthma in Adults and Children Older Than 5 Years of Age

Goals of Asthma Treatment

- Prevent chronic and troublesome symptoms (e.g., coughing or breathlessness in the night, in the early morning, or after exertion)
- Maintain (near) "normal" pulmonary function
- Maintain normal activity levels (including exercise and other physical activity)
- Prevent recurrent exacerbations of asthma and minimize the need for emergency department visits or hospitalizations
- Provide optimal pharmacotherapy with minimal or no adverse effects
- Meet patients' and families' expectations of and satisfaction with asthma care

Classify Severity of Asthma

	Clinical Features Before Treatment*		
	Symptoms**	**Nighttime Symptoms**	**Lung Function**
STEP 4 Severe Persistent	■ Continual symptoms ■ Limited physical activity ■ Frequent exacerbations	Frequent	■ FEV_1 or PEF ≤60% predicted ■ PEF variability >30%
STEP 3 Moderate Persistent	■ Daily symptoms ■ Daily use of inhaled short-acting beta$_2$-agonist ■ Exacerbations affect activity ■ Exacerbations ≥2 times a week; may last days	>1 time a week	■ FEV_1 or PEF >60% - <80% predicted ■ PEF variability >30%
STEP 2 Mild Persistent	■ Symptoms >2 times a week but <1 time a day ■ Exacerbations may affect activity	>2 times a month	■ FEV_1 or PEF ≥80% predicted ■ PEF variability 20-30%
STEP 1 Mild Intermittent	■ Symptoms ≤2 times a week ■ Asymptomatic and normal PEF between exacerbations ■ Exacerbations brief (from a few hours to a few days); intensity may vary	≤2 times a month	■ FEV_1 or PEF ≥80% predicted ■ PEF variability <20%

* The presence of one of the features of severity is sufficient to place a patient in that category. An individual should be assigned to the most severe grade in which any feature occurs. The characteristics noted in this figure are general and may overlap because asthma is highly variable. Furthermore, an individual's classification may change over time.

** Patients at any level of severity can have mild, moderate, or severe exacerbations. Some patients with intermittent asthma experience severe and life-threatening exacerbations separated by long periods of normal lung function and no symptoms.

emergency visits or hospitalizations for asthma, and using medication to control asthma with as few side effects as possible. The family needs to be involved in the care of both children as well as adults and an open dialogue between the physician and the patient is essential for successful asthma treatment.

Although it may seem difficult to achieve medication adjustment and asthma education in a 30-minute office visit, the daily diary can serve as a remarkable time-saving tool. A quick review will allow the patient (and/or parent) to highlight difficulties and help the physician focus on the important clinical changes required in management. In addition, the more active a role the patient (and/or parent) plays in management of the disease, the greater likelihood of compliance with medication and avoidance of triggers. Well-placed reminders in the office such as posters illustrating proper technique for metered dose inhaler administration or the technique for peak flow measures can reinforce the message while the patient is waiting in the exam room. In general, the more education during those first visits, the greater the likelihood of disease control long-term.

Asthma is increasing in prevalence throughout the country. Unfortunately, just when more physician-patient interaction is necessary to treat this disease, less time is available. For asthmatics to get the care they need, more efficient assessment, management and education need to occur in the office.

References

1. Adams PF, Marano MA. Current estimates from the National Health Interview Survey, 1994. Vital Health Stat 1995;10:94.
2. Centers for Disease Control and Prevention. Asthma-United States 1989-1992. *MMWR* 1995; 43:952-5.
3. Centers for Disease Control and Prevention. Asthma mortality and hospitalization among children and young adults-United States 1990-1993. *MMWR* 1996; 45:350-53.
4. National Asthma Education and Prevention Program. *Expert Panel Report: Guidelinesfor the Diagnosis and Management of Asthma.* National Institutes of Health pub no 91-3642. Bethesda, MD, 1991.
5. National Asthma Education and Prevention Program. *Expert Panel Report 2: Guidelines for the Diagnosis and Management of Asthma.* National Institutes of Health pub no. 97-4051. Bethesda, MD 1997.

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FIGURE 3 Stepwise Approach for Managing Asthma in Adults and Children Older Than 5 Years of Age

	Treatment (Preferred treatments are in bold print.)		
	Long-Term Control	**Quick Relief**	**Education**
STEP 4 Severe Persistent	Daily medications: ■ **Anti-inflammatory: inhaled corticosteroid (high dose)** AND ■ Long-acting bronchodilator: either **long-acting inhaled beta$_2$-agonist,** sustained-release theophylline, or long-acting beta$_2$-agonist tablets AND ■ Corticosteroid tablets or syrup long term (2 mg/kg/day, generally do not exceed 60 mg per day).	■ Short-acting bronchodilator: **inhaled beta$_2$-agonists** as needed for symptoms. ■ Intensity of treatment will depend on severity of exacerbation; see component 3-Managing Exacerbations. ■ Use of short-acting inhaled beta$_2$-agonists on a daily basis, or increasing use, indicates the need for additional long-term-control therapy.	Steps 2 and 3 actions plus: ■ Refer to individual education/counseling
STEP 3 Moderate Persistent	Daily medication: ■ Either **Anti-inflammatory: inhaled corticosteroid (medium dose)** OR **Inhaled corticosteroid (low-medium dose)** and add a long-acting bronchodilator, especially for nighttime symptoms: either **long-acting inhaled beta$_2$-agonist,** sustained-release theophylline, or long-acting beta$_2$-agonist tablets. ■ If needed Anti-inflammatory: **inhaled corticosteroids (medium-high dose)** AND **Long-acting bronchodilator,** especially for nighttime symptoms; either **long-acting inhaled beta$_2$-agonist,** sustained-release theophylline, or long-acting beta$_2$-agonist tablets.	■ Short-acting bronchodilator: **inhaled beta$_2$-agonists** as needed for symptoms. ■ Intensity of treatment will depend on severity of exacerbation; see component 3-Managing Exacerbations. ■ Use of short-acting inhaled beta$_2$-agonists on a daily basis, or increasing use, indicates the need for additional long-term-control therapy.	Step 1 actions plus: ■ Teach self-monitoring ■ Refer to group education if available ■ Review and update self-management plan
STEP 2 Mild Persistent	One daily medication: ■ **Anti-inflammatory:** either **inhaled corticosteroid** (low doses) or **cromolyn or nedocromil** (children usually begin with a trial of cromolyn or nedocromil). ■ Sustained-release theophylline to serum concentration of 5-15 mcg/mL is an alternative, but not preferred, therapy. Zafirlukast or zileuton may also be considered for patients ≥12 years of age, although their position in therapy is not fully established.	■ Short-acting bronchodilator: **inhaled beta$_2$-agonists** as needed for symptoms. ■ Intensity of treatment will depend on severity of exacerbation; see component 3-Managing Exacerbations. ■ Use of short-acting inhaled beta$_2$-agonists on a daily basis, or increasing use, indicates the need for additional long-term-control therapy.	
STEP 1 Mild Intermittent	■ No daily medication needed.	■ Short-acting bronchodilator: **inhaled beta$_2$-agonists** as needed for symptoms. ■ Intensity of treatment will depend on severity of exacerbation; see component 3-Managing Exacerbations. ■ Use of short-acting inhaled beta$_2$-agonists more than 2 times a week may indicate the need to initiate long-term-control therapy.	■ Teach basic facts about asthma ■ Teach inhaler/spacer/holding chamber technique ■ Discuss roles of medications ■ Develop self-management plan ■ Develop action plan for when and how to take rescue actions, especially for patients with a history of severe exacerbations ■ Discuss appropriate environmental control measures to avoid exposure to known allergens and irritants (See component 4.)

Step down
Review treatment every 1 to 6 months; a gradual stepwise reduction in treatment may be possible.

Step up
If control is not maintained, consider step up. First, review patient medication technique, adherence, and environmental control (avoidance of allergens or other factors that contribute to asthma severity).

NOTE:
- **The stepwise approach presents general guidelines to assist clinical decisionmaking; it is not intended to be a specific prescription. Asthma is highly variable; clinicians should tailor specific medication plans to the needs and circumstances of individual patients.**
- Gain control as quickly as possible; then decrease treatment to the least medication necessary to maintain control. Gaining control may be accomplished by either starting treatment at the step most appropriate to the initial severity of the condition or starting at a higher level of therapy (e.g., a course of systemic corticosteroids or higher dose of inhaled corticosteroids).
- A rescue course of systemic corticosteroids may be needed at any time and at any step.
- Some patients with intermittent asthma experience severe and life-threatening exacerbations separated by long periods of normal lung function and no symptoms. This may be especially common with exacerbations provoked by respiratory infections. A short course of systemic corticosteroids is recommended.
- At each step, patients should control their environment to avoid or control factors that make their asthma worse (e.g., allergens, irritants); this requires specific diagnosis and education.
- Referral to an asthma specialist for consultation or comanagement is *recommended* if there are difficulties achieving or maintaining control of asthma or if the patient requires step 4 care. Referral may be *considered* if the patient requires step 3 care (see also component 1-Initial Assessment and Diagnosis).

All That Wheezes Isn't Asthma:
Why Primary Care Physicians Don't Use the Guidelines for the Diagnosis and Treatment of Asthma

Michael Fine, MD

The challenge of primary care diagnosis and treatment is to turn a patient's report of discomfort, received in their language, into a coherent diagnosis that makes medical sense, and then initiate treatment based on that diagnosis. Primary care physicians see a different universe of complaints from specialty physicians, and only a few of these complaints persist and meet criteria for the diagnosis of disease.

It is easy to confuse a history of asthma with asthma itself. Patients frequently report they have asthma when they may not have had the formal pulmonary testing or office spirometry necessary to establish the diagnosis. (This is particularly true for patients who received the diagnosis as children, a time when the diagnosis is based on symptom presentation and not objective testing.) Patients may have once had asthma but the asthma may have remitted, a situation known to all primary care physicians but not reflected in guidelines, which do not contain recommendations for periodic retesting, as the duration of asthma is not known. Or pediatric patients may have simply received the wrong diagnosis, having presented with recurrent stridor or chronic cough; and years later the patient considers him/herself an asthmatic.

Patients frequently report they have asthma when they may not have had the formal pulmonary testing or office spirometry necessary to establish the diagnosis.

It is also easy to confuse wheezing, dyspnea or chronic cough with asthma, particularly if these complaints occur chronically or recurrently. The differential diagnosis of wheezing presenting to the primary care physicians includes post-infectious wheezing (most common by far); allergic wheezing that does not meet the criteria for asthma, congestive heart failure, gastroesophageal reflux, foreign body obstruction, and cold- and exercise-induced bronchospasm that does not meet the criteria for asthma. The differential diagnosis for dyspnea presenting to the primary care physician includes deconditioning, panic disorder, cardiac disease including active ischemic heart disease, restrictive lung disease, pneumonia and other interstitial diseases of the lung, intra-thoracic neoplasm and sleep apnea. The differential diagnosis for chronic cough includes chronic sinusitis, chronic tracheitis, gastrophageal reflux, congestive heart failure, intra thoracic neoplasm, neoplasm of the head neck or throat, allergic post nasal drip, other interstitial lung disease, and sleep apnea.

In order to make use of these guidelines, then, primary care physicians will need to approach the diagnosis of asthma with new rigor, recognizing that the guidelines are useful only when the diagnostic criteria are fulfilled. It may take many office visits, many diagnostic modalities, and many therapeutic trials to establish the diagnosis of asthma with certainty. These Guidelines are to be used only when the diagnosis is firmly established. It must also be recognized that there are no guidelines for the treatment of non-asthma wheezing, a condition whose effective treatment, at present, depends on the knowledge, skill and art of the treating primary care physician.

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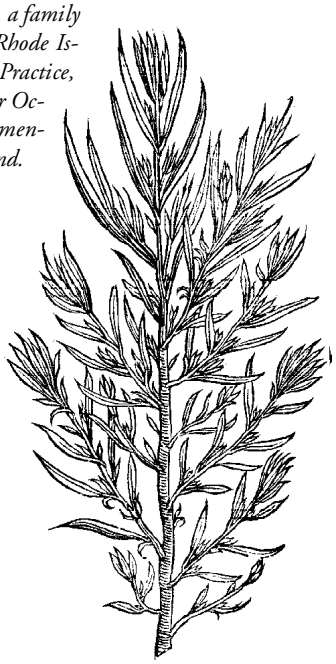

A Conversation: Managing Asthma in Children,
Mary Ann Passero, MD, and David Chronley, MD

compiled by Mary Ann Passero, MD

Dr. Chronley:

For several years the asthma experts have re-emphasized the importance of treating airway inflammation as well as bronchospasm in persistent asthma.[1] Apparently inflammation occurs not only during acute exacerbations of asthma but is also present in the airways of patients with even mild daily symptoms.[2]

Dr. Passero:

Yes. It was recently reported that adults who identify themselves as having asthma have substantially greater declines in FEV_1 over time than those who do not.[3] Data from the Childhood Asthma Management Program show that lung function in children also declines faster than normal and the decline is directly related to the duration of the child's asthma.[4] Even children under 4 years of age with a history of persistent wheezing for as little as 2 years may have lost pulmonary function which cannot be completely corrected.[5]

Dr. Chronley:

"Airway remodelling" denotes the loss of airway caliber in asthma secondary to chronic inflammation.[6] Even though airway remodeling may occur very early in the course of the disease, not all asthma patients develop irreversible airway obstruction. It is not even clear that aggressive therapy with anti-inflammatory agents can completely prevent airway remodeling.

Dr. Passero:

All you say is true, but those patients with more severe persistent symptoms who are atopic and especially those patients who have adult relatives with persistent asthma are at greater risk. Several studies have shown that the regular use of inhaled steroids for persistent wheezing will decrease the frequency and severity of asthma exacerbations, reduce the need for emergency room visits, hospitalizations and systemic steroids, and also improve the quality of life for adults and children with persistent asthma.[5-7] Other anti-inflammatory agents such as cromolyn, nedocromil and the leukotriene receptor antagonists are available for children or adolescents but may not always be as effective as inhaled steroids in controlling airway inflammation in some patients.

Abbreviations Used:

BDP	beclomethasone diproprionate
FDA	Food and Drug Administration

Dr. Chronley:

We know that prolonged use of *systemic* steroids is associated with adrenal suppression, cataracts, glaucoma, osteoporosis, growth retardation, immunosuppression and glucose intolerance. We have been told that the relatively small amounts of systemic steroids absorbed while *inhaled* make them much safer for long term use. But now almost 30 years after inhaled steroids were introduced for asthma treatment, there have been several records of systemic side effects related to long term use. Most of the more serious problems are related to prolonged use of inhaled steroids in adults. For us pediatricians, the most disturbing news is that significant growth suppression can be measured in some children after as little as 3 months of use.[7-9]

Dr. Passero:

Although in short term prospective studies the use of inhaled steroids has shown measurable reduction in the growth rates of prepubertal children, long term retrospective studies show that asthmatic children receiving inhaled steroids eventually achieve normal predicted adult height. However, in the longer retrospective studies it is not clear that the inhaled steroids were given consistently in the same dose as in the shorter studies.[10] The data on growth suppression in children is compelling enough for the FDA to put labels on inhaled steroids warning parents and patients on their potential for growth suppression.

Dr. Chronley:

In sufficient doses all currently available inhaled steroid preparations have been shown to cause systemic effects.[9] Some of the systemic effects of beclomethasone diproprionate (BDP) and triamcinolone are the result of oral and gastrointenstinal absorption, which can be reduced to some extent by using spacers and teaching patients to rinse their mouths after use.

Newer inhaled steroid preparations such as flunisolide, budesonide, and fluticasone have "first hepatic pass metabolism," so that the oral and gastrointestinally absorbed drug has minimal systemic effect. However, all the steroid that gets past the bronchi and into the alveoli is systemically absorbed.[9]

Dr. Passero:

New data suggest that each of the available inhaled steroids coupled with an appropriately tested delivery device has a "safe" low dose even for children as young as 4 years of age.[10-13] Although there may be some variations between patients, the data suggest that doses of less than 400 micrograms per day of BDP and budesonide and less than 200 micrograms per day of fluticasone do not cause growth retardation.[10] There is little data to help us with the long term use of inhaled steroids in children

under 4 years of age. In addition, concomitant use of nasal steroids may reduce the "safe" dose. We also know that for many young asthma patients these "safe" doses will not be sufficient to consistently control their asthma.

Those patients with more severe bronchospasm and airway inflammation tend to deposit more of the drug in the larger airways where it is useful and less in the alveoli where it leads to systemic effects. On the other hand, as the disease improves, more inhaled steroid is liable to reach the alveoli and be systemically absorbed. Using inhaled steroid primarily in the morning may also reduce side effects.[10]

Dr. Chronley:

For selected patients with mild persistent asthma who are willing to use prophylactic inhalers frequently, cromolyn or nedocromil can be effective and safe. In moderate or severe persistent asthma the addition of these mast cell stabiliziers may reduce the need for higher dose inhaled steroids. Similarly, leukotriene receptor antagonists which have become available in the past 2 years may be effective in selected mild persistent asthma and in combination with inhaled steroids in moderate and severe asthma. Montileukast, a leukotriene receptor antagonist, has been approved for children as young as six years of age; Zafirleukast, for children 12 years of age and above. Leukotriene receptor antagonists appear to be relatively free of severe short term side effects. There are not yet any long term follow up studies addressing safety or efficacy. Since these are oral drugs and need to be taken only once (montileukast) or twice (zafirleukast) a day, compliance is not usually a problem.[14]

Salmeterol is a long-active beta agonist, which has been used as an inhaler twice a day to control night time asthma as well as providing more consistent bronchodilator during the day. Together with an inhaled steroid it has been shown to reduce the need for high dose inhaled steroid to achieve asthma control. Salmeterol in a disc inhaler has become available for children as young as 4 years of age.[15-17]

Long-acting theophylline preparations may also be used in selected patients to achieve asthma control along with low-dose inhaled steroids. They have a narrow therapeutic window and require frequent serum level monitoring. Even in the desired low therapeutic range they may cause attention problems, gastrointestinal upset and headache. Theophylline also has important drug interactions with erythromycin, antifungal agents, zafirleukast, etc.

Several studies have shown that the regular use of inhaled steroids for persistent wheezing will decrease the frequency and severity of asthma exacerbations, reduce the need for emergency room visits, hospitalizations and systemic steroid, and also improve the quality of life for adults and children with persistent asthma.

The data on growth suppression in children is compelling enough for the FDA to put labels on inhlaed steroids warning parents and patients …

Dr. Passero:

Careful monitoring of the child's symptoms and response to therapy is key to avoiding either under- or over-medication.

Although pulmonary function testing and monitoring of peak flow is useful in children as well as adults, there is no reliable convenient objective measurement of pulmonary function in infants and very young children. Parents both underreport cough and shortness of breath in infants and young children and overreport wheezey and stridorous noises that may be of upper airway origin. The physician must not only assess the child's respiratory status and response to medication using physical signs and symptoms in the office, but must also teach the child's parents which signs and symptoms to watch for and which can be safely ignored.

The older child can be taught to recognize his or her own signs and symptoms and report them appropriately. Peak flow meters can be helpful, but peak flow is quite effort-dependent. Clinical signs and symptoms must be assessed together with peak flow and frequency of need for short-acting bronchodilators to make correct therapeutic adjustments.

Individual and group asthma care classes can reinforce teaching begun in the hospital or office setting. It is not enough to institute home monitoring. The patient and parents must have a written plan to respond to a change in symptoms, signs and/or peak flow reading and a "fail-safe" plan if the change in regimen is not effective. Written plans for the delivery of asthma medications at school, day care, camp, etc., must also be made. Given our concern over the long term use of inhaled steroids, there must be a "step down" as well as a "step up" plan. Communication between the patient, his/her parents and the health care provider is crucial.

For those patients on chronic inhaled steroids, monitoring in the office should consist of height and weight with appropriate growth curves. Peak flow measurements should be obtained at every visit. Timed expiratory flow (FEV_1) is a better measure than peak flow to assess progression of airway disease. Spirometry (before and after inhaled bronchodilator) should be done when the child is old enough to cooperate and periodically thereafter so long as the child continues to require asthma medication. Patients requiring higher dose inhaled steroids will need more frequent spirometry as well as other monitoring. Patients using minimal "safe" doses may require less frequent visits.

During each visit the child's medications, symptoms and response to medication should be re-evaluated and his treatment plan adjusted. Some patients may require more frequent monitoring during certain seasons than in others. Not only medications, but spacers and monitoring plans must be adjusted as the patient grows older and his needs and/or symptoms change. In short, every patient requires his own individual plan.

Dr. Chronley:

We have been talking about medication, but many environmental factors contribute to airway inflammation. Tobacco smoke should always be eliminated from the child's environment. High exposure to viral respiratory infections in a day care or play group setting may play a significant role in the persistence of wheezing in the infant or young child. Changing to a smaller

group setting or limiting the number of children under age 3 in the group may help. Scrupulous hand washing, the use of disposable cups or eating utensils and frequent washing of shared toys may also help to reduce the frequency and severity of respiratory infections in day care settings.

Particularly in children, asthma is seen more frequently in atopic patients. Reducing exposure to known allergens (animal danders, dust mites, cockroaches, molds and pollens) can often be done at relatively low cost and without adding medication.

Allergen-proof encasings for mattresses, pillow and boxsprings, eliminating pets, washing bedclothes and plush animals frequently, eliminating "dust collectors," reducing carpeting and upholstery in bedroom and play areas, avoiding strong-smelling perfumes and housing cleaning agents all can be done at relatively little cost.

In selected cases more extensive improvements in ventilation, air-conditioning, humidity reduction or air filtration may be necessary.

Dr. Passero:

The allergist may be of help in identifying allergic triggers. Rarely food allergies may play a role. More ammunition in the form of positive skin testing may be necessary to convince a family to remove a pet. If environmental allergens are a significant asthma trigger and cannot be easily avoided, hyposensitization to selected allergens may be effective.

Dr. Chronley:

Adherence to a comprehensive treatment plan with frequent office visits, a complex daily regimen and frequent monitoring requires great effort on the part of patients and their families as well as health care providers.

Today's families, with two working parents and a complex academic and social schedule for each child, seem to be stretching their limits even without the addition of an asthma regimen. Adolescents, particularly, may be expected to medicate and monitor themselves. There seem to be more lost, stolen or destroyed inhalers, spacers and peak flow meters than those in active use.

Exposure to animals at a sleep-over, or exploring a damp basement or dusty attic, may be dangerous to the asthma patients even though acceptable for everyone else.

Just like diabetes patients, asthma patients do not want to be different from their peers and may deny their illness and stop using prophylactic medication.

A disproportionate number of asthma children belong to minorities and live below the poverty level. Social, economic and psychologic stresses also interfere with adherence to an asthma regimen. Education and detailed therapeutic and monitoring plans may still not prevent a child from being lost to follow-up and reappearing only when in the midst of a severe asthma attack.

Dr. Passero:

It is precisely these patients who cannot adhere to asthma treatment guidelines who are our greatest challenge. Many of the poorest will at least qualify for medical assistance or RIte Care. Asthma affects over 5 million U.S. children. It is the most common cause for pediatric hospital admissions. It accounts for more lost school days than any other chronic childhood disease.[18] We may hope to offer safer more effective and less complex asthma regimens to children in the future, but for the moment we must address today's asthma with today's tools.

New data suggest that each of the available inhaled steroids coupled with an appropriately tested delivery device has a "safe" low dose even for children as young as 4 years of age.

References

1. *Guidelines for the Diagnosis and Management of Asthma: Expert Panel Report II.* Bethesda, MD: National Institutes of Health; 1997 Publication 97-4051.
2. Nadel JA, Busse WW. Asthma. *Am J Respir Crit Care Med* 1998;157(suppl):130-8.
3. Lange P, Parner J, Vestro K, et al. A 15 year follow up study of ventilatory function in adults with asthma. *NEJM* 1998;339:1174-200.
4. Zeiger R, Dawson C, Weiss S. Relationship between duration of asthma and asthma severity among children in the Childhood Asthma Management Program (CAMP). *J All Clin Immunol* 1999;103:376-87.
5. Selroos O, Pietinahlo A, Lofroos AB, et al. Affects of early vs. late intervention with inhaled corticosteroids in asthma. *Chest* 1995;108:1228-34.
6. Redington AE, Howarth PH. Airway wall remodelling in asthma. *Thorax* 1997;52:310-2.
7. Agertoft L, Pederson S. Effects of long-term treatment with an inhaled corticosteroid in growth and pulmonary functions in asthmatic children. *Respir Med* 1994;88:373-81.
8. MacKenzie C. Effect of inhaled corticosteroids on growth. *J All Clin Immunol* 1998;101:5451-5.
9. Toogood J. Side effects of inhlaed corticosteroids. *J All Clin Immunol* 1998;102:702-713.
10. Allen D. Do inhaled steroids impair growth? It all depends. *J Resp Dis* 1998;19:1023-36.
11. O'Byrne P, Pederson S. Measuring efficacy and safety of different inhlaed corticosteroid preparations. *J All Clin Immunol* 1998;102:879-86.
12. Allen D, Bronsky E, Laforce C, et al. Growth in asthmatic children treaed with fluticasone proprionate. *J Peds* 1998;132:472-7.
13. Shapiro G, Mendelson L, Kreemer M, et al. Efficacy and safety of budesonide inhalation suspension in young children with inhaler steroid-dependent asthma. *J All Clin Immunol* 1998;102:789-96.
14. Drazen J, Israel E, O'Byrne P. Treatment of asthma with drugs modifying the leukotriene pathway. *NEJM* 1999;340:197-208.
15. Greening A, Ind P, Northfield M, et al. Added salmeterol vs. higher dose corticosteroid in asthma patients with symptoms on existing inhlaed corticosteroids. *Lancet* 1994;344:219-24.
16. Russell G, Williams A, Weller P, Price J. Salmeterol xinafoate in children on high dose inhaled steroids. *Annals Allergy, Asthma, Immun* 1995;75:423-8.
17. Weinsteon S, Pearlman D, Bronsky E, et al. Efficacy of Salmeterol xinafoata powder in children with chronic persistent asthma. *Annals Allergy Asthma, Immun* 1998;81:51-8.
18. Mannino DM, Home DM, Pertoski CA, et al. Surveillance for asthma - United States 1960-1996. *MMWR* 1998;47(SS-1):1-27.

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Leukotriene Modifiers – A New Treatment Option for Asthma

Cynthia A. Wedekind, PharmD

Asthma is a chronic inflammatory condition affecting 14 million to 15 million people in the United States.[1] Despite both improved understanding of the disease and better medication choices, the morbidity and mortality rates continue to rise. In 1997, the National Institutes of Health issued new guidelines for treatment which focus on the prevention of acute episodes by controlling the underlying chronic inflammatory disease.[1] The guidelines acknowledge a role for leukotriene modifiers in the treatment of mild to moderate asthma. However, it remains unclear which patients will benefit most and when to introduce these medications into the treatment strategy. Currently three such agents have been approved for use in the US: zafirlukast, montelukast, and zileuton. Several other agents are under investigation.

Leukotriene modifiers are the first new class of medications to treat asthma in over 20 years. They were developed as an oral alternative to corticosteroids to treat the chronic inflammation associated with asthma. Leukotrienes (LTs) are inflammatory mediators which cause airway obstruction and hyperresponsiveness. Their synthesis begins with the breakdown of membrane phospholipids, resulting in increased vascular permeability and mucus production, and causing a powerful constriction of bronchial smooth muscle.[2] Arachidonic acid (AA) is the key substrate of LT generation.

Abbreviations Used:

LT	leukotriene
AA	arachidonic acid
PG	prostaglandin
TXA2	thromboxane A2
5-LO	5-lipoxygenase
LTRA	leukotriene-receptor antagonist
FEV_1	forced expiratory volume in one second
PEFR	peak expiratory flow rate
LFT	liver function test
FLAP	5-LO activating protein

Following its release from membrane phospholipids by hydrolysis, arachidonic acid is metabolized by one of two pathways.[3] The cyclooxygenase pathway results in the production of prostaglandins (PGs) and thromboxane A2 (TXA2). The 5-lipoxygenase (5-LO) pathway produces LTs. Previously identified as "Slow-Reacting Substances of Anaphylaxis," LTs are known to consist of several separate compounds. The dihydroxy LT, LTB4, acts directly at the LTB4 receptor to cause neutrophil chemotaxis, aggregation and activation, leading to the release of superoxide and other mediators.[3] LTB4 has not been found to play a large role in the inflammatory response of asthma. The cysteinyl LTs (LTC4, LTD4, and LTE4) are generated by mast cells and other inflammatory cells. Studies have shown that the exogenous administration of the cysteinyl LTs mediates bronchial smooth muscle contraction, mucus secretion, and vascular leakage.[4] There are two classes of medications acting via LT modulation: the competitive leukotriene receptor antagonists (LTRAs), including zafirlukast and montelukast, and the LT synthesis inhibitors, including zileuton.

Table 1. Summary

	Zafirlukast	Montelukast	Zileuton
Indication	Mild to moderate asthma in patients > 12 years	Mild to moderate asthma in adults and children ≥ 6 years	Mild to moderate asthma in patients > 12 years
Mechanism of Action	-LT receptor antogonist -Inhibits LTD4	-LT receptor antogonist -Inhibits LTD4	-LT synthesis inhibitor -Inhibits 5-LO
Dose	20 mg twice daily on an empty stomach	≥ 15 years: 10 mg daily 6-14 years; 5 mg daily	-600 mg 4 time daily - Take with meals and at bedtime
Adverse Effects	Headache Cough Rhinitis	Headache Cough Upper respiratory infections	Elevated ALT Headache Abdominal pain Myalgias Dyspepsia Nausea
Drug Interactions	Aspirin Erythromycin Terfenadine Theophylline Warfarin	No significant interactions noted	Propreanolol Terfenadine Theophylline Warfarin
Availability	20 mg tablets	5 mg chewtabs 10 mg tablets	600 mg tablets
AWP* 30 day supply	$59.77	$69.50 (5 or 10 mg dose)	$82.33

*AWP is the "average wholesale price" to pharmacies taken from the *Red Book* , Cardinale V, ed., Montvale, NJ, Medical Economics, 1999.

Zafirlukast (Accolate®)

Zafirlukast, the first leukotriene receptor antagonist approved for use in the US, is indicated for the long-term management of asthma in patients 12 years of age and older. In three 13-week, randomized, double-blind, placebo-controlled trials enrolling over 1300 patients with mild to moderate asthma, zafirlukast demonstrated a statistically significant reduction in daytime symptoms and nighttime awakenings, $beta_2$-agonist use, and improvement in forced expiratory volume in one second (FEV_1) and peak expiratory flow rate (PEFR).[5] Adverse effects with zafirlukast have been minimal, with the largest complaints being headache, rhinitis and cough. Recently, there have been reports linking the use of zafirlukast to Churg-Strauss Syndrome, a rare

eosinophilic vasculitis.[6] Only sporadic cases have been reported to date, but this clearly indicates an area where continued research is needed. Zafirlukast undergoes extensive metabolism in the liver via the cytochrome P-450 system, and drug interactions are common (Table 1). The bioavailability of zafirlukast is decreased when administered with food, so it must be taken on an empty stomach.

All three leukotriene modifiers have shown promise in reducing symptoms associated with chronic asthma, offering an alternative to patients currently maintained on inhaled corticosteroids.

Montelukast (Singulair®)

Montelukast is a selective antagonist of the LTD4 receptor. It has been studied and approved for use in both adults and children greater than 6 years of age. Benefits associated with montelukast include once-daily administration and a relatively safe side effect profile. In a 12-week, multicenter, randomized, double-blind, placebo-controlled trial, montelukast demonstrated significant improvement in asthma control.[7] A total of 681 subjects were evaluated in the study, 408 in the treatment group and 273 in the placebo group. Montelukast, 10 mg daily, demonstrated statistically significant improvement of airway obstruction, documented by an increase in FEV_1 of 13.1% (placebo, 4.2%), morning PEFR of 24 L/min (placebo, 4.6 L/min), and evening PEFR of 15.9 L/min (placebo, 4.2 L/min). Patient-reported endpoints, including daytime asthma symptoms, as-needed $beta_2$-agonist use, and nocturnal awakening were all significantly improved in the treatment group. Side effect profiles were similar between the two groups, with the most commonly reported side effects in the treatment group being headache and upper respiratory infections.[7] Montelukast has also been studied in children ages 6 – 14 years. In a two month study of 336 children with chronic asthma, a daily dose of 5 mg of montelukast increased FEV_1 by 8.23% (placebo, 3.58%).[8] Secondary outcomes including daily as-needed $beta_2$-agonist use and quality of life measures were also more favorable in the treatment group. In summary, the studies support the use of montelukast in the management of chronic asthma.

Zileuton (Zyflo®)

Zileuton is a potent selective inhibitor of 5-LO. Unlike the LTRAs, zafirlukast and montelukast, zileuton inhibits the production of both LTB4 and the cysteinyl LTs. The long-term effects of zileuton were evaluated in a 13-week, randomized, double-blind, parallel design study.[9] A total of 401 patients were enrolled in three subject groups: 600 mg zileuton 4 times daily (n=132), 400 mg zileuton 4 times daily (n=134), and placebo 4 times daily (n=135). The 600 mg zileuton group demonstrated statistically significant improvements in FEV_1, asthma exacerbations requiring corticosteroid treatment, and quality-of-life issues. However, elevated liver function tests (LFTs), defined as greater than 3 times normal, were noted in both treatment groups when compared with placebo. All elevations reversed upon discontinuation of the medication.[9] The incidence of elevated LFTs has prompted a warning against the use of zileuton in patients with a history of hepatic dysfunction. All patients receiving zileuton should have LFTs measured prior to initiation of treatment, monthly for the first three months, and periodically thereafter. If an elevation of LFTs (greater than 3 times normal) is noted, the medication should be discontinued. Zileuton is extensively metabolized in the liver and significant drug interactions can occur (Table 1). Zileuton has a half-life of approximately 2 hours. For this reason, it requires a four times daily dosing regimen, which may be difficult for noncompliant patients.

Conclusion

All three leukotriene modifiers have shown promise in reducing symptoms associated with chronic asthma. The simple dosing regimens of zafirlukast and montelukast may be advantageous in noncompliant patients. Zileuton may not offer this compliance benefit as its short half-life requires frequent dosing. Zileuton also carries the risk of elevated LFTs, the monitoring of which will add to the overall cost of the medication. The efficacy of these medications in clinical practice remains to be seen.

References

1. National Heart, Lung, and Blood Institute, National Asthma Education Program, Expert Panel Report 2. Guidelines for the Diagnosis and Management of Asthma. Bethesda, Maryland: U.S. Department of Health and Human Services, 1997; publication no. 97-4051.
2. Sorkness CA. The use of 5-lipoxygenase inhibitors and leukotriene receptor antagonists in the treatment of chronic asthma. *Pharmacotherapy* 1997; 17 (1 Pt 2): 50S-54S.
3. Spector SL. Leukotriene activity modulation in asthma. *Drugs* 1997; 54: 369-84.
4. Drazen JM. Pharmacology of leukotriene receptor antagonists and 5-lipoxygenase inhibitors in the management of asthma. *Pharmacotherapy* 1997; 17 (1 Pt 2): 22S-30S.
5. Calhoun WJ. Summary of clinical trials with zafirlukast. *Am J Respir Crit Care Med* 1998; 157: S238-S246.
6. Katz RS, Papernik M. Zafirlukast and Churg-Strauss Syndrome. *JAMA* 1998; 279: 1949-50.
7. Reiss TF, Chervinsky P, Dockhorn RJ, Shingo S, Seidenberg B, Edwards TB. Montelukast, a once-daily leukotriene receptor antagonist, in the treatment of chronic asthma. *Arch Intern Med* 1998; 158:1213-20.
8. Markham A, Faulds D. Montelukast. *Drugs* 1998; 56: 251-6.
9. Israel E, Cohn J, Dube L, Drazen JM. Effect of treatment with zileuton, a 5-lipoxygenase inhibitor, in patients with asthma. *JAMA* 1996; 275: 931-6.

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Managing Asthma in Rhode Island Schools

Ann Kelsey Thacher, MS, and Rosemary Reilly-Chammat, MPA

Introduction - Overview of Problem

Asthma is increasingly diagnosed in Rhode Island school-aged children. Schools cannot ignore this disease if they want to succeed in their mission, and physicians cannot ignore schools if they want their patients to succeed in managing their asthma. Effective asthma management requires collaboration among student and families, physicians, and school staff. (Table 1)

The National Heart, Lung and Blood Institute (NHLBI), Asthma Education and Prevention Program, School Asthma Education Subcommittee identified seven areas for asthma management in schools: school nursing services; (and health services staff in schools); medication administration; physical education opportunities; emergency plans; smoke free schools; other indoor air quality issues; education for students and staff.

First and foremost, the student's physician must develop an individualized asthma management plan, which enables the child to participate in school activities to the maximum extent. Before leaving the office, the patient (parent) should have this plan in hand. [See Charles Sherman, "Management of Asthma in the Office," this issue.] The implementation of this plan is accomplished through a partnership among the provider, the family, the school nurse and other school personnel, as well as the student. That plan should include: student information; asthma triggers, school environmental control measures, premedication, and/or dietary restrictions; peak flow monitoring schedule; daily medication plan; any special conditions; emergency asthma plan including emergency asthma medication; recommendations on self-administration of medication

The success of any asthma management plan rests on the ability of the child to implement it. Younger children will need assistance, but with older children, families, schools and primary care providers should make "self-management" the goal.

Health Services Staff in Schools

The health professionals with overall and day-to-day responsibility for health services provided in schools should work closely with students' primary care providers. All school districts must have a school physician, licensed in Rhode Island and under contract to the district (RIGL 16-21-9). This physician serves as a consultant to develop school health protocols and provide training for school nurses. School nurse teachers (certified by the Department of Elementary and Secondary Education and licensed as registered nurses in Rhode Island (RIGL 16-21-8)) administer the school health program. (In non-public schools, registered nurses licensed in Rhode Island are considered "substantially equivalent" for individual health care, including dispensing medication in schools.) The school nurse should be a daily educator and reinforcer of a child's asthma education plan and should feel empowered to communicate with children's primary care providers as often as necessary. The school nurse can link school and physician.

Abbreviations Used:

COZs	Child Opportunity Zones
MOB	Majority Over Butts
NHLBI	National Heart, Lung and Blood Institute
SBHC	School-Based Health Centers

Medication Administration

General provisions in Rhode Island law require that school health programs must be carried out by certified school nurse teachers. However, current laws and regulations make no provision for medication administration in schools with the exception of RIGL 16-21-22 and RIGL 16-21-22 which permit students to carry and use prescription epinephrine auto-injectors and inhalers while at school or school-sanctioned events. Within these legal constraints, individual districts have had the latitude to develop their own medication policies.

School nurses usually have assumed the responsibility for medications. They administer, or remind children to self-administer, and reinforce instruction on the use of inhalers and peak flow meters. If the nurse is full-time, these tasks are readily accomplished. If the nurse is at the school part-time alternative plans need to be developed. Students need the opportunity to take needed medications during the school day, and it is clear from current standards of health care practice that no lay personnel, other than a parent, legal guardian, or the student him/herself, should administer medications.

However, there are currently no statewide regulations that specify policies for administration, storage, self-carry and self-administration of non-prescription or prescription medications in schools (with the exception of epinephrine and inhalers, noted above). The development of such policies is complicated by the commitment of many districts to a "drug free schools" policy.

Under discussion is a new section in the Rules and Regulations for School Health Programs on Medication Administration. The proposed regulations include the following:

- A signed authorization from a parent must be obtained.
- All medications must be stored in their original pharmacy and/or manufacturer labeled containers with the

Table 1.
HOW DOCTORS CAN HELP THEIR SCHOOL-AGED ASTHMA PATIENTS

- Develop a written asthma management plan with the patient and his/her family.
- Learn about the school your patient attends:
  - What are the school policies and protocols about medication administration, emergency treatment, etc.?
  - What are the school resources for health education and health services?
  - Who is the school nurse teacher and what does she know about the patient's management needs?
- Share asthma education materials with patients, their families, and their schools.
- Encourage physical activity in and out of school.

name of the student clearly indicated on the container.

- Principals must be informed of any agreements for medication self-carry and administration.
- All medications to be administered by the school nurse must be stored in a secured cabinet.
- A licensed provider's order shall be obtained and verified by the school nurse.
- School districts must make provisions for self-carry and self-administration of medications prescribed for longer than one month.

At the time of writing, these regulations were under development.

Physical Education

Physical activity is important to the health of all children, including those with asthma. Childhood obesity is epidemic; inactive children can develop lifelong patterns putting them at risk for a variety of chronic diseases. Full participation in physical education should be encouraged in the "special condition" portion of the asthma management plan. The only routine contraindication to exercise is when activities take place outdoors during times of high air pollution levels. The physician should advise on the use of any medication before physical activity and the steps to take if asthma symptoms occur during physical activity. Both the student and the school nurse should know those recommendations. If the child develops symptoms, the school nurse should refer the child back to the provider since that indicates a need to modify long-term therapy. Curtailment of physical activity is a last resort in the treatment of asthma.

Emergency Plan

According to the Rules and Regulations for School Health Programs, each school must have written protocols and standing orders for injuries and acute illnesses, including anaphylaxis (developed by the school physician). In-service basic first-aid training must be provided to school personnel who might be involved in managing a medical emergency. Personnel to be trained are identified by the school principal or other designated school authority; at all times, at least one person, in addition to the school nurse, who is trained in the use of an epinephrine auto injector must be on site. Once again, the school district designs the training protocols. The school physician and school nurse are responsible for implementing the protocols and usually providing the training, so they should be contacted with any questions about the emergency procedures in specific schools.

Smoke Free Schools

One of the most common environmental irritants for asthmatics is tobacco smoke. Since 1992, Rhode Island has banned smoke in school settings (RIGL 23-20.9). The law covers all public and private elementary and secondary schools during and after school hours. It includes classroom buildings, playgrounds, administration buildings, athletic facilities, locker rooms, buses and other school vehicles, and other outside areas within twenty-five feet of any school building. (Teachers cannot have a separate "smoking lounge.")

This law has enabled advocates to demand the enforcement of smoke free schools. By September 1993, all Rhode Island schools were required to have "enforcement" policies. Often those policies merely restate the law. Especially in middle and high schools, there are frequent informal complaints, particularly of smoke-filled student restrooms. Some schools have attempted to supervise restrooms, some use smoke alarms, others have locked them (not a recommended practice); still others have ignored them.

Enforcement of the smoke free school act is variable. The enforcement provision in the law specifies that written confidential complaints citing school violations be directed to the Rhode Island Department of Health for investigation. The Department then serves written notice to the governing body of the school requiring corrective action within ten days. Second complaints for the same or continued violations in the same school result in a referral to the Rhode Island Attorney General, who may assess and recover a civil penalty. Since 1993, there has been only a handful of complaints referred to the Department; all were resolved.

Changing the mindset of students is crucial: it is far easier to make schools truly smoke-free if students themselves want them smoke-free. Chariho High School is an example of student "no-smoking" activism. In the Majority Over Butts (MOB) campaign, students conducted an initiative to enforce the state Smoke Free Schools law. Tired of smoke in their lavatories, students organized a petition drive garnering 770 signatures from other students, and held a demonstration outside the school which increased the willingness of reluctant school administrators to work with students to strengthen the school smoking policy. (One student designed a t-shirt distributed to demonstrators.) The students were supported and guided in their efforts by the school athletic director, who suggested action in response to their complaints about the smoking. The group has produced a video that describes how to implement a MOB project.

Indoor Air Quality

Aside from tobacco smoke, other common asthma triggers include house dust mites and indoor fungi (molds), and chemical odors from products used for cleaning, in science laboratories or in art classes . [See Robert Vanderslice and Lynn Bibeault, "Asthma and the Environment," this issue.] A 1995 Government Accounting Office report, *School Facilities: Profiles of School Conditions by State*, reported that 30% of Rhode Island schools had unsatisfactory indoor air quality.

Schools, as employers, are governed by OSHA standards, which are enforced by RI Department of Labor and Training. While important for occupational safety, the OSHA regulations address some, but not all of the indoor air quality triggers. The Environmental Health Division of the RI Department of Health can provide technical assistance; school facility managers and local building inspectors also can help.

One provision in the 1997 statute, Article 31 (RIGL 16-7.1), requires schools to have a five-year capital outlay plan (the Asset Protection Plan). The Healthy Schools! Healthy Kids! initiative of the Rhode Island Departments of Health and Education has worked closely with school district facilities' managers to help schools address environmental problems.

Although this has not resolved all indoor air quality problems, long range planning of capital replacement and maintenance is a first step.

Additionally, the Federal Environmental Protection Agency's "Tools For Schools" helps schools develop an indoor air quality management plan. [See Robert Vanderslice and Lynn Bibeault, "Asthma in the Environment," this issue.]

Education for Students and Staff

Primary educators in the schools include school nurse teachers and health educators, and, at the elementary level, classroom teachers. Often teachers are eager to work with community organizations to enhance the health information delivered in schools, and there is a wealth of information on asthma for educators.

Rhode Island's Health Education Framework provides many opportunities to infuse age-appropriate information about asthma to students. Students can learn how to support classmates with asthma, encourage classmates to participate in physical activities and follow their asthma management plan. The Department of Education supports the standards with its Health Education Resource Center. Listings of resources are available on-line. [See Table, "What's Happening in the Community: A Compendium," this issue.]

Ways to Fill Gaps

School-Based Health Centers (SBHC) located in five Rhode Island schools (one in Central Falls, Pawtucket, Providence, two in Woonsocket) are also allies in asthma management. The SBHCs have, on-site, medical and behavioral health staff.

Child Opportunity Zones (COZs), located in 19 districts, serve primarily elementary schools. Also with on-site staff, COZs link health and social services to schools and are a vehicle to integrate community resources into schools. (See Table 2)

Concluding Recommendations

Physicians should contact the nurses in the schools which their patients attend.

Physicians can also work with the schools to advocate adherence to policies and laws that impact all children including those with asthma including RIGL 16-7.1, 16-21-22, 23-20.9 and the Rules and Regulations for School Health Programs.

A comprehensive approach to asthma management, in partnership with school personnel, patients and their families, can ensure that children will be full participants in school. The benefits include reduced absenteeism due to asthma attacks and/or emergency visits; increased participation in physical activity, particularly in physical education classes; increased adherence to physician treatment orders; and adoption of lifelong self care skills.

Table 2. Child Opportunity Zone (COZ) Family Center Coordinators

City	Contact	Phone
Bristol-Warren	Joan Ricci	247-3730
Central Falls	Mario Papino	727-7700,x15
Coventry	Sue Conde	822-9400
Cranston	Jeanne Rheaume	943-3029
Cumberland	Rosemarie Crozier	726-2030
East Providence	Grace Osediacz	435-7857
Middletown	Katie Jones	849-2122
Newport	Christine Arouth	845-8579
North Kingstown	Donna Thompson	541-6340
Pawtucket	Mary Parella	729-6293
Providence		
D'Abate	Kathy Hackett	456-1710
Gilbert Stuart	Ramona Rodriguez Mejia	831-5845
Fogarty	Peggy Byrnes	421-0956
Camden	William Bentley	455-3895
Sackett	Aleda Spaulding	461-7940
Woonsocket	Terry Curtin	766-3384
Westerly	Sally Mitchell	596-0315,x218

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References

1. General Accounting Office. *School Facilities: Condition of America's Schools*. US General Accounting Office; GAO/HEHS-95-61; 1995.
2. Goldberg E. *Educational Planning for Students with Chronic Health Conditions.* Newton , MA: Healthy Kids: The Key to Basics, 79 Elmore Street, Newton, MA 02159
3. Minnesota Department of Health. *Asthma Education: An Integrated Approach*,; 717 Delaware St., SE; PO Box 9441; Minneapolis, MN 55440-9441; 1998.
4. NHLBI, Asthma Education and Prevention Program. *Asthma Management and Prevention: a Practical Guide for Public Health Officials and Health Care Professionals*. National Institutes of Health; NIH Pub. No 96-3659A; 1995.
5. NHLBI, Asthma Education and Prevention Program. *Asthma Management in Minority Children: Practical Insights for Clinicians, Researchers, and Public Health Planners.* National Institutes of Health; NIH Pub. No 95-3675; 1995a.
6. NHLBI, Asthma Education and Prevention Program. *Nurses: Partners in Asthma Care*. National Institutes of Health; NIH Pub. No 95-3308; 1995b.
7. NHLBI, Asthma Education and Prevention Program. *Expert Panel Report 2: Guidelines for the Diagnosis and Management of Asthma.* National Institutes of Health; NIH Pub. No 97-4051; 1997.

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What's Happening in the Community: A Compendium

Betina Ragless

A collection of asthma-oriented community resources exists to help patients and families.

American Lung Association of RI (401) 421-6487 or 1-800-LUNG-USA

- General literature on asthma in children and adults, treatment and allergy avoidance.
- Educational seminars for adults and parents of children with asthma held around the state throughout the year.
- Asthma Support Group - for adults and parents of children with asthma.
  The group meets the first Wednesday of the month, October through December and March through June at Evergreen House in East Providence from 7-9 pm.
- School Based Programs
  - A is for Asthma - for children 3-5 years of age and child-care professionals. This educational program, in English and Spanish, features Sesame Street characters Elmo, Rosita, Luis and new Muppet Dani, who has asthma. Caregivers and children learn about asthma as the Sesame Street Muppets sing, dance and talk about Dani's needs. Youngsters will also learn how to help when someone is having trouble breathing.
  - Open Airways for Schools - this program, tested and refined in elementary schools across the country, is a package of easy-to-use teaching materials including a curriculum, instructors guide, poster flip chart, and reproducible handouts for both children and parents in English and Spanish. The program consists of six interactive lessons for children ages 8-11. The package, designed to serve an entire elementary school, can be used over and over.
- Indoor Air Quality Tools for Schools - Easy-to-use kit from the Environmental Protection Agency shows schools how to carry out a practical plan of action at little or no cost using common sense activities and in-house staff to identify and prevent indoor air quality problems. Compliments Open Airways for Schools. [See Robert Vanderslice and Lynn Bibeault, "Asthma and the Environment," this issue.]

Blue Cross/Blue Shield of RI - BlueChip (401)459-5817 or 1-800-637-3718, x 5817

- Easy Steps for Healthy Living - Asthma! - Small informal classes for children, teenagers and adults with asthma, and parents of children with asthma. Participants must attend both of two sessions. Free to Blue Cross/Blue Shield, BlueChip members.

Harvard Pilgrim Health Care of NE (401)331-4034 ext. 42373

- Pediatric and adult small group and one-on-one educational classes in inhaler use, peak flow meter use and controlling environment to reduce or avoid common triggers.

Hasbro Children's Hospital (401) 444-8340 or 444-3092 for information

- Draw A Breath Asthma Education- a multi-disciplinary approach for education and advocacy for children with asthma in RI and Southeastern Massachusetts. Weekly programs led by a multi-disciplinary team present lectures and interactive projects on environmental triggers of asthma, and strategies for family and school issues involving asthma. Free spacers and peak flow meters are given families that need them. This year-around program is sponsored by the donations of the Chris and Lisa Van Allsburg family of Providence and Lifespan. No medical insurance is required.
- Draw A Breath Asthma Camp - An overnight camp for children ages 9-13 with moderate to severe asthma. Includes regular camping activities and daily lessons in the care and management of asthma. 24-hour nursing and physician coverage. The Isaac B. Lawton Foundation is the principal sponsor of the camp which is held at the Canonicus Camp and Counseling Center. Many free camperships are available to children with moderate to severe asthma. Lifespan and the ALA donate in-kind support.
- Draw A Breath Childhood Asthma Awareness Week - An annual event held the first week in November offering a series of educational programs for health professionals (physicians, nurses, respiratory therapists and others) and families concerning childhood asthma. Keynote speaker on November 6, 1999: Robert Lemanske, MD, who will be speaking on Viruses and Asthma. Many other events planned.
- Draw A Breath Web Page— a Web site of information and links to important asthma Web resources for RI and Southeastern Massachusetts families with asthma: www.drawabreath.com
- Draw A Breath Community Initiative- a RI community effort funded by the Rhode Island Foundation to provide asthma education to the Providence community at sites near schools throughout the city. It is a collaboration with the organizations "Parents Making A Difference" and the Draw a Breath Asthma Initiative.

Asthma Information on the Internet

(compiled by Rosermary Reilly-Chammat, MPA)

Allergy and Asthma Network (Mothers of Asthmatics, Inc.)
www.aanma.org

American Academy of Allergy, Asthma and Immunology
www.aaaai.org

American Association of Respiratory Care
www.aarc.org

American College of Allergy, Asthma, and Immunology
www.allergy.mcg.edu

American Lung Association
www.lungusa.org

ARA: Asthma Education Resources on the Web
222.arai.com/asthmaed

Asthma, Air Quality in Schools
cnet.unb.ca/cap/partners/chsptf/air_quality

Asthma and Air Quality: A Survey of Schools
www.nfer.ac.uk/summary/asthma

Asthma and Allergy Foundation of America
www.aafa.org

Asthma Information Center
www.mdnet.de/asthma

Asthma and Allergy Information and Research (AAIR)
www.users.globalnet.co.uk/~air

Asthma and School
www.allergyasthma.com/archives/asthma04

Asthma Society
www.asthmasociety.com/manual

Canadian Lung Association
www.lung.ca/asthma/index.html

Daily Lung Newspaper
www.dailylung.com

Food Allergy Network
www.foodallergy.org

JAMA Asthma Information Center
www.ama-assn.org/special/asthma

Journal (asthma) articles
www.mediconsult.com/asthma/journal/content.html

National Asthma Education & Prevention Program, NHLBI
www.nhlbi.nih.gov/nhlbi

National Jewish Medical and Research Center
www.njc.org

National Education Association
www.nea.org/hin/air

New York City Department of Health: Open Airways for Schools
www.ci.nyc.ny.us/html/scah/openair.html

Open Airways for Schools
ehpnet1.niehs.nih.gov/docs/1996/104-5/iti.html

Rhode Island Department of Education, Health Education Resource Center
www.ri.net/RIDE/health/bibliography

Rhode Island Department of Health
www.health.state.ri.us/regs

U.S. Department of Education
www.ed.gov/offices/ocr

U.S. Environmental Portection Agency
www.epa.gov/iaq

University of Iowa
vh.radiology,uiowa.edu/...gingAllergies

University of Texas-Houston
www.uth.tmc.edu/uth_org...rs/uthouston/feb_96/inner

Neighborhood Health Plan of RI (401)459-6000 or 1-800-963-1001

- Pediatric and adult asthma education programs in small groups or one-on-one in the home. Adults and children are taught use of inhalers and peak flow meters, and environmental control of triggers.

United Health Plans of NE (401)737-6900 or 1-800-822-3807

- Pediatric Asthma Care and Education (PACE) Program - An in-home assessment by a respiratory care practitioner to tailor an educational plan for the individual child and family on early warning signs and symptoms, medications, triggers and school care. Can be provided in languages other than English.
- Asthma Education (ACE) Program - In-home assessment of an adult with asthma (and/or COPD) by a respiratory care practitioner to provide education on the respiratory system, exercises, relaxation techniques, use of inhalers, and nutrition. Can be provided in languages other than English.

Available to United Health Plan members only.

St. Michael's/Harvard Pilgrim Health Plan of New England/ Private Practice Physicians

- "Taming Asthma" Program - This free clinic for adults and children who are under/uninsured offers one-on-one and small group asthma instruction on medication use, environmental issues, and patient peer education. Clinic open 1 evening a month. Located at BroadMed, 557 Broad Street, Providence, RI . phone: (401) 273-1888

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CENTER TABLE 1. Sample Questions* for the Diagnosis and Initial Assessment of Asthma

A "yes" answer to any question suggests that an asthma diagnosis is likely.

In the past 12 months,...

- Have you had a sudden severe episode or recurrent episodes of coughing, wheezing (high-pitched whistling sounds when breathing out), or shortness of breath?
- Have you had colds that "go to the chest" or take more than 10 days to get over?
- Have you had coughing, wheezing, or shortness of breath during a particular season or time of the year?
- Have you had coughing, wheezing, or shortness of breath in certain places or when exposed to certain things (e.g., animals, tobacco smoke, perfumes)?
- Have you used any medications that help you breathe better? How often?
- Are your symptoms relieved when the medications are used?

In the past 4 weeks, have you had coughing, wheezing, or shortness of breath...

- At night that has awakened you?
- In the early morning?
- After running, moderate exercise, or other physical activity?

*These questions are examples and do not represent a standardized assessment or diagnostic instrument. The validity and reliability of these questions have not been assessed.

CENTER TABLE 2.

Patient Self-Assessment: Example of Patient Diary

Date	Wheeze	Cough	Activity	Sleep	Quick Relief: $Beta_2$ – Agonist	Cromolyn/Nedocromil	Inhaled Steroids	Other – Inhaled	Oral Steroids	Theophylline	Peak Flow AM	Peak Flow PM	Peak Flow Other Times	Comments

Wheeze	None = 0	Some = 1	Medium = 2	Severe = 3
Cough	None = 0	Occasional = 1	Frequent = 2	Continuous = 3
Activity	Normal = 0	Can run short distance or climb 3 flights of stairs = 1	Can walk only = 2	Missed school or work or stayed indoors = 3
Sleep	Fine = 0	Slept well, slight wheeze or cough = 1	Awake 2-3 times, wheeze or cough = 2	Bad night, awake most of the time = 3

* Adapted with permission from Plaut 1991.

This diary is provided as an example for clinicians.

CENTER TABLE 3. **Sample* Patient Self-Assessment Sheet for Followup Visits**

Name:_____ Date:_____

How many days in the past week have you had chest tightness, cough, shortness of breath, or wheezing (whistling in your chest)?	___0 ___1 ___2 ___3 ___4 ___5 ___6 ___7
How many nights in the past week have you had chest tightness, cough, shortness of breath, or wheezing (whistling in your chest)?	___0 ___1 ___2 ___3 ___4 ___5 ___6 ___7
Do you perform peak flow readings at home?	___ yes ___ no
If yes, did you bring your peak flow chart?	___ yes ___ no
How many days in the past week has asthma restricted your physical activity?	___0 ___1 ___2 ___3 ___4 ___5 ___6 ___7
Have you had any asthma attacks since your last visit?	___ yes ___ no
Have you had any unscheduled visits to a doctor, including to the emergency department, since your last visit?	___yes ___no
How many puffs of your short-acting inhaled $beta_2$-agonist (quick-relief medicine) do you use per day?	_____ Average number of puffs per day
How many of your short-acting inhaled $beta_2$-agonist inhalers did you go through over the past month?	_____ Number of inhalers in past month

What questions or concerns would you like to discuss with the doctor?

_____

_____

_____

How well controlled is your asthma in your opinion?	___ very well controlled ___ somewhat controlled ___ not well controlled
How satisfied are you with your asthma care?	___ very satisfied ___ somewhat satisfied ___ not satisfied

*These questions are examples and do not represent a standardized assessment instrument. The validity and reliability of these questions have not been assessed.

CENTER TABLE 4.

PATIENT NAME	D.O.B.	HPHC NUMBER
ADDRESS	MO	PHYSICIAN NAME
	FA	PHYSICIAN PHONE NO.
PHONE (HOME)	PHONE (WORK)	PROVIDER NUMBER

ASTHMA MANAGEMENT PROGRAM • ACTION PLAN

PHYSICIAN ADDRESS

GREEN

GREEN ZONE: Doing Well

- No cough, wheeze, chest tightness, or shortness of breath during the day or night
- Can do usual activities

And, if a peak flow meter is used,
Peak flow: more than _____
(80% of more of my best peak flow)

My best peak flow is: _____

Take These Long-Term-Control Medicines Each Day. Use Spacer with Inhalers (Include an anti-inflammatory)

Medicine	How much to take	When to take it

Before Exercise ☐ _____ ☐ 2 or ☐ 4 puffs 5 to 60 minutes before exercise

YELLOW

YELLOW ZONE: Asthma is Getting Worse

- Cough, wheeze, chest tightness, or shortness of breath, or
- Waking at night due to asthma, or
- Can do some, but not all, usual activities

-OR-

Peak flow: _____ to _____
(50% - 80% of my best peak flow)

FIRST **Add: Quick-Relief Medicine, Use Spacer - and keep taking your GREEN ZONE medicine**

_____ ☐ 2 or ☐ 4 puffs, every 20 minutes for up to 1 hour
(short-acting beta$_2$-agonist) ☐ Nebulizer, once

SECOND **If your symptoms (and peak flow, if used) return to GREEN ZONE after 1 hour of above treament:**
☐ Take the quick-relief medicine every 4 hours for 1 to 2 days.
☐ Double the dose of your inhaled steroid for _____ (7-10) days. -OR-

If your symptoms (and peak flow, if used) do not return to GREEN ZONE after 1 hour of above treatment:

☐ Take: _____ ☐ 2 or ☐ 4 puffs or ☐ Nebulizer
(short-acting beta$_2$-agonist)

☐ Add: _____ mg. per day For _____ (3-10) days
(oral steroid)

☐ Call the doctor ☐ before / ☐ within _____ hours after taking the oral steroid.

RED

RED ZONE: Medical Alert!

- Very short of breath, or
- Quick-relief medicines have not helped, or
- Cannot do usual activites, or
- Symptoms are same or get worse after 24 hours in Yellow Zone

-OR-

Peak flow: less than _____
(50% of my best peak flow)

WORSENING DANGER SIGNS

- Trouble walking and talking due to shortness of breath
- Lips or fingernails are blue

Take this medicine:

☐ _____ ☐ 4 or ☐ 8 puffs or ☐ Nebulizer
(short-acting beta$_2$-agonist)

☐ _____ mg.
(oral steroid)

THEN CALL YOUR DOCTOR NOW. DO NOT DRIVE. Go to the hospital or call for an ambulance if:
- You are still in the Red Zone after 15 minutes and
- You have not reached your doctor.

- Take ☐ 4 or ☐ 6 puffs of your quick-relief medicine AND
- **DO NOT DRIVE.** Go to the hospital or **CALL 911 NOW.**

ADDITIONAL INFORMATION	AUTHORIZING PCP SIGNATURE	DATE

From: *Facts About Controlling Asthma*, National Asthma Education and Prevention Program, National Heart, Lung, and Blood Institute, NIH Publication No. 97-2339 A Reproducible Handout

Asthma and the Environment: A Physician's Guide to Resources, Research and Data

Robert Vanderslice, PhD, and Lynn Bibeault, MS

Environmental Causes and Contributing Factors

Environmental exposures are both causal factors for the onset of asthma and contributing factors for the development of the disease in predisposed individuals. The onset of asthma is caused by factors that sensitize the airways. Inhaled allergens, such as those from mites, animal fur, fungi and pollen, are the most common sensitizers. Population studies strongly suggest that allergens may cause the onset of asthma by continuously stimulating chronic allergic inflammation of the airways. As an example, in Barcelona, epidemics of asthma exacerbations were traced to days when soybeans were loaded without a filter. This raised awareness that small amounts of airborne allergen can cause major changes in the lungs of sensitized people. In addition, those treated at the hospital were already allergic to the dust, suggesting that sensitization can occur at low atmospheric concentrations.

The most common indoor allergens are house dust mites, animal allergens, cockroach allergen, and fungi. Mites feed on human and animal scales and are often buried deep in carpets, mattresses and soft furnishings. Mite allergen is found in mite bodies, secretions and excretions. Mite allergen is the main source of allergen in dust. One study has correlated exposure to domestic mites in the first year of life to subsequent development of asthma.

Animal allergens are found in saliva, urine, feces, and dander of warm-blooded animals. Cats are potent sensitizers. Other sources of animal allergens include dogs, pet rodents (often kept in children's rooms) and wild mice or rats in some inner-city areas.

Sensitization to cockroach antigen may be more common than sensitization to dust mite antigen in some locations and among some ethnic groups. Molds and yeasts also act as indoor allergens. *Alternaria* has been established as a risk factor for asthma and been associated with the risk of asthma death in the U.S.

Outdoors, pollens and fungi are the most common allergens that cause asthma in susceptible people. Pollen-induced asthma exacerbations seem to be caused by small particles of starch granules that are released from pollens, particularly, after rainfall. *Alternaria* and *Cladosporium* (which are also indoor fungi) are the only fungi that have been established as risk factors for asthma, tending to be seasonal.

Occupational sensitizers probably represent the only firmly documented cause of asthma in adults. Occupational agents causing asthma include animal proteins (e.g., poultry mites in poultry workers), plant proteins (e.g., flour and amylase in bakers), inorganic chemicals (e.g., persulfate in beauty shops, and stainless steel fumes in welding), and organic chemicals (e.g., glutaraldehyde in hospitals).

Contributing factors increase the likelihood of the devleopment of asthma once exposure to a causal factor has occurred. They may increase susceptibility to asthma. Contributing factors from the environment include passive smoking, active smoking in some occupational settings, air pollution and indoor air pollutants.

Passive smoke (also known as environmental tobacco smoke or second-hand smoke) has been linked to increased respiratory symptoms in children as well as an increased risk for asthma and exacerbations of asthma. Parental smoking has been associated with increased respiratory morbidity, particularly during the first two years of life. Risk is increased with maternal smoking. There appears to be an increase in the risk of asthma in children whose parents smoke, but studies have not confirmed this.

Active smoking is unlikely to be a risk factor for the development of asthma in general. However, for some workers exposed to certain sensitizers, smoking may increase the risk of developing occupational asthma.

In heavily polluted cities, outdoor air pollutants (e.g., sulfur dioxide, ozone, and nitrogen oxides) can trigger bronchoconstriction, transiently increase air responsiveness, and enhance allergic responses. In theory, therefore, pollution may contribute to the development of asthma. However, epidemiological studies attmepting to link the rising trend in asthma with outdoor air polluton have been inconclusive. Some believe that it is possible that chronic exposure to pollution may predispose respiratory disease in a more subtle and complicated manner.

Indoor air pollution has been linked to the development of asthma by some data, but more research is needed. The following are among problems related to indoor air pollution: Respirable particles (from cooking or heating with wood, coal, or kerosene) have been associated with nose irritation, respiratory infections and bronchitis, and lung cancer. Nitrogen oxides (from cooking or heating with natural gas, liquid propane, wood, coal, or kerosene) can cause nose irritation, impaired lung function, and increased infections in children. Formaldehyde (from foam, glue, fireboard, pressed board, plywood, particleboard, carpet backing, and fabrics) has been shown to cause difficulty in breathing and asthma symptoms.

Environmental Triggers

Triggers cause asthma exacerbations by inducing inflammation or provoking acute bronchoconstriction or both. Some triggers (like irritant gases) cannot cause asthma to develop initially, but can exacerbate asthma once it is present. Other triggers (like allergens and occcupational agents) are further exposures to causal factors that have already sensitized the airways of the person with asthma.

It has recently been discovered in incidents such as the one in Barcelona that very small amounts of airborne allergens are able to cause asthma exacerbations and major changes in the lungs of sensitized people. Therefore, once a person is sensitized, indoor or outdoor allergens can cause asthma exacerbations.

Maternal smoking increases the requirements for medication and emergency room visits for children with asthma. Other irritants that may exacerbate asthma include wood smoke, household sprays, volatile organic compunds (such as polishes and cooking oil) and air pollution. Sulfur dioxide can trigger a dose-dependent airflow limitation in patients with asthma, although it has no effect on the airways of normal subjsects up to very high concentrations. Sulfur dioxide may cause airflow limitation at concentrations as low as 1ppm, a level that may encountered in the workplace.

(Source: National Institutes of Health, *Global Initiative for Asthma*, January 1995, NHLBI Publication 95-3659).

Information

The patient, family, and clinician can learn more about environmental irritants from these sources:

- National Institutes of Health, Global Initiative for Asthma. January 1995; NHLBI Publication 9 5-3659.)
- Greater Boston Physicians for Social Responsibility, Their web site, "Air Pollution and Primary Care Medicine," (www.psr.org/breathe.htm) references the literature relating air pollution to lung disease, including asthma, with details on specific sensitizers (ex. isocyanates), irritants and nonspecific sensitizers (ex. ozone, sulfur dioxide, and nitrogen dioxide), and adjuvants (ex. diesel exhaust, second had smoke) and their impact on asthmatics.
- The Massachusetts Medical Society
  The Society produces a curriculum on environmental asthma and a talk/slide show with annotated references. Contact: Jeff Dickey, MD, Community Health Center of Franklin County, 338 Montague City Road, Turners Falls, MA 01376; (413) 772-3748; fax (413) 772-2940; email: jdickey@massmed.org
- Plant Guides for Identification of Pollen Triggers
  Asthma patients who are sensitive to the pollen of certain plants can identify those plants and the seasons for producing the most pollen.
  - Newcomb's Wildflower Guide has an excellent key system for identifying plants in bloom. Available at the Audubon Society gift shop in Smithfield, Rhode Island.
  - The New England Wild Flower Society, Garden in the Woods. 180 Hemenway Road, Framingham, MA 01701-2699 (508/877-7630) (http://www.newfs.org) library and bookstore stocks fields guides and information about local plants, including bloom times.
- Rhode Island Department of Environmental Management. The RIDEM Office of Air Resources (222-2808) has available literature on air quality, including the health effects of air pollutants.

Regulatory/Monitoring Activities

The government has taken steps to regulate or monitor the levels of certain triggers.

- *Ground-level ozone*
  Ground-level ozone can build to build to irritating levels in the hot summer. The state Department of Environmental Management and the Rhode Island Department of Health jointly issue Ozone Alerts to the press on days when the ozone levels may be high enough to cause respiratory distress, particularly in children, people who work or exercise outdoors, and people with asthma and other lung conditions.
  RIDEM posts a 'Daily Ozone Forecast' on the Office of Air Resources (www.state.ri.us/dem/ozone/ozoneday.htm.)
  The Environmental Protection Agency Ozone Mapping System gives forecasts for all Northeast states (www.epa.gov/region01/oms/.)
  Contact: Lennie Giuliano 222-2808 x 7041

- *Second-hand Smoke*
  Asthmatics can be particularly troubled by environmental tobacco smoke, which may irritate their airways and/or heighten their response to other allergens.

The Rhode Island Department of Health (RIDOH) administers three salient laws:

– Smoking in Public Places (RI General Laws 23-20.6) passed 02/10/99

Smoking is not permitted in any of the following places used by or open to the public: the state house, elevators, indoor movie theaters, libraries, art galleries, museums, concert halls, auditoriums, buses, primary, secondary or post secondary school buildings, colleges and universities (including dormitories), and public hallways in court buildings, hallways of elderly housing complexes, supermarkets, medical offices and public laundries.

A person in charge of a public area listed above must make reasonable efforts to prevent smoking

and post "No Smoking" and warning signs conspicuously. The Attorney General may fine a non-compliant facility $50-$500/day.

Eating facilities (excluding night clubs, lounges, dance clubs, and privately sponsored social affairs) with a seating capacity of fifty or more persons must have separate seating for nonsmokers and smokers. Appropriate arrangements must be made to ask patrons their preference prior to being seated. The person in charge of the facility must post signs as follows:

(A) At the entry stating that the establishment is required by law to have a no-smoking section; and

(B) In the smoking sections identifying the area.

– Workplace Smoking Pollution Control Act (RI General Laws 23-20.7)

Each RI employer must maintain a written smoking policy that states that any nonsmoking employee may object to his/her employer about the smoke hazard or discomfort in the workplace. Using existing means of ventilation or separation or partition of the work space:

(1) The employer shall attempt to reach a reasonable accommodation to protect the nonsmoking employees and to ensure a comfortable environment for all employees.

(2) If the employer cannot make such accommodation, he must prohibit smoking in those areas of the workplace where nonsmoking employees may reasonably be expected to be adversely affected by passive smoke.

The employer's smoking policy shall be announced within three weeks of adoption and posted conspicuously.

Environmental exposures are both causal factors for the onset of asthma and contributing factors for the development of the disease in predisposed individuals.

– Smoke-Free Schools (RIGL 23-20.9)

The law bans smoking in schools and at school events. See Ann Kelsey Thacher and Rosemary Reilly-Chammat, "Managing Asthma in the Schools," this issue

COMPLAINT INVESTIGATION

The Office of Compliance and Inspection (222-1360) can respond to complaints about outdoor air quality, like odor and smoke.

Carbon Monoxide and Nitrogen Dioxide in Ice Arenas

In 1992, after skaters in several incidents were overcome by carbon monoxide from gas-powered ice resurfacing equipment and heaters, RI joined Minnesota as the second state to regulate air quality in ice arenas. Since 1992, no carbon monoxide poisonings related to ice arena have been received. However, simply tuning engines to reduce carbon monoxide may actually increase levels of nitrogen dioxide, which can cause airway hyper-reactivity. Given this information, and no additional regulatory requirements, most arena managers have either replaced their gas-powered ice resurfacing equipment or plan to do so, eliminating the most significant source of dangerous fumes in these arenas. At a cost of $75,000 to $100,000 per machine replaced, this represents a serious voluntary commitment to improving air quality, which exceeds regulatory requirements.

RI DOH attributes this success to the collaboration in drafting both the law and regulations and implementing the program. Arena managers were assembled to discuss the carbon monoxide poisoning events and plausible solutions before attempts were made at regulation. These managers directed the crafting of the law and regulations to best suit the real circumstances of their work. In addition, managers were asked what they needed to implement the program and technical assistance was tailored to these needs.

Contact: Robert Vanderslice, Ph.D. 222-4948 x 2103

Indoor Air Quality in schools: Tools for Schools

Asthma is a cause of chronic absenteeism in schools. The American Lung Association estimates that there are an average of two asthmatic children in each U.S. classroom, sometimes higher in urban schools. Unfortunately, New England states are among the worst ten for self-reporting environmental problems in schools (U.S. General Accounting Office Reports on School Facilities.)

An EPA program addresses poor indoor air quality in schools. Three years ago, the Regional Indoor Environment Program introduced EPA's easy-to-use kit "Indoor Air Quality Tools for Schools" at the New England Asthma and Allergy's conference for school nurses. EPA and its local partners have sponsored over 40 workshops and conferences introducing Tools for Schools, distributing over 1000 copies of the kit. EPA is tracking their use.

The Tools for Schools kit (cosponsored by the National PTA, National Education Association, Association of School Business Officials, American Federation of Teachers, Council for American Private Education and the American Lung Association) offers a practical plan to prevent and resolve indoor air problems at little or no cost using in-house staff. The kit includes checklists, a flexible step-by-step guide for coordinating

the checklist and sample policies and strategies to get information out to the whole school community. EPA, in conjunction with the popular TV series, This Old House, has produced a short video (filmed at Dedham, MA, high school) about how to operate ventilation systems in schools.

Eugene Benoit and MaryBeth Smuts of EPA Region I (Boston) report success in assisting schools to implement Tools for Schools, particularly when working with the state Committee for Occupational Safety and Health (COSH) groups and when responding to parental concerns regarding problem schools. Several schools and school systems in each New England state are now recruited as pilot programs. Eugene and MaryBeth have focused on the largest school districts in New England, but have assisted in establishing IAQ teams in smaller rural districts as well. Those Rhode Island school districts with pilots are Bristol County and Providence.

In Vermont, a state legislative committee is considering adopting the Tool for Schools approach for every school.
Contacts: Eugene Benoit (617) 918-1639; MaryBeth Smuts, Ph.D. (617) 918-1528

Research Efforts

Because asthma is a baffling epidemic linked to the environment, researchers are investigating the linkage. The following are local research initiatives:

- **Brown University Center for Environmental Studies lead/asthma link**

Are the same homes causing both childhood lead poisoning and asthma? The Center for Environmental Studies previously demonstrated that homes of lead poisoned children were more likely to have code violations, environmental violations, and section 8 subsidies. These indicators may provide inexpensive means to identify housing most likely to cause health problems, allowing focused targeting of prevention and remediation.

Kim Mowery has investigated the link between addresses which have been both the home of a child with lead poisoning and a person hospitalized for asthma.
Contact: Kim Mowery at Kimberly_Mowery@brown.edu

- **National Cooperative Inner City Asthma Study**

The National Cooperative Inner City Asthma Study , sponsored by the National Institute of Allergy and Infectious Diseases (NIAID) of the National Institutes of Health, seeks to identify risk factors for severe asthma in children in inner cities, design an intervention program to reduce the risk factors and monitor improvement. Factors being studied are indoor allergens (dust mite, cat, cockroach), tobacco smoke, and indoor pollutants.

Findings from the first two phases of this study are available. In Phase I, which included 1,500 children, a number of factors were found to be associated with asthma severity, including high levels of indoor allergens (especially cockroach allergen); high levels of smoking among family member and caretakers; and exposure to high levels of nitrogen dioxide, a respiratory irritant. In addition, over half of the participants found it difficult to get follow-up care for their asthma.

In Phase 2, more than 1,000 high risk children and their families were assisted by a nurse practitioner in managing the child's condition and instituting environmental controls, such as the removal of cockroach allergens from their homes. Over 90% of enrolled families complied with the intervention, which led to a striking reduction of asthma symptoms, better school attendance, and a 30% decrease in asthma-related hospitalizations and unscheduled physician and emergency visits for asthma.
(http://www.niaid.nih.gov/director/art1h.htm)
Contact: Sahi Rafiullah (301) 496-6752

- **Tufts/BU study of indoor environmental factors in Boston Public Housing**

This community-based project initiated by Tufts University School of Medicine and Boston University School of Public Health included the South Boston Community Health Center and the Tenants Task Force at the West Broadway Housing Development. The project consisted of development of a survey instrument, collection and analysis of data, development of follow-up plans, implementation of action items and refinement and dissemination of the model to other public developments in Boston.

In short, tenants and health center staff were trained about the indoor environment, including environmental hazards and health problems, such as asthma. Together, the university researchers and community partners developed, field-tested and used a 142 question survey that covered a range of environmental and safety issues. Fifty surveys were completed; the results revealed that priority concerns were heating problems, moisture from leaks and the biological growth that moisture promotes, child physical safety and smoking (half of respondents reported being smokers). In addition, 26% of adult respondents reported having been diagnosed with asthma by a doctor.

These findings led to a series of follow-up steps. The South Boston Community Health Center has undertaken an expanded training program about the indoor environment for tenants of the West Broadway Housing Development. Boston Medical Center has begun to collect exposure data on biological and chemical factors in the homes of asthmatic tenants. The Boston Housing Authority is replacing the heating system. The university partners are replicating the project at the Franklin Hill Public Housing Authority.

An unpublished manuscript, *Public Health in Public Housing: A Community-Based Survey of Residents*, by H.Patricia Hynes, Doug Brugge, Julie Watts and Jody Lally, describes this project. Contact: Doug Brugge at Dbrugge@aol.com

Data Sources on Asthma in RI

Although physicians are not required to report asthma to the Health Department, researchers can find data on asthma from the following government-collected sources (with considerations for medical confidentiality and Institutional Review Board approval):

- **Deaths**

Data on causes of death are maintained at the RI Department of Health, Office of Vital Records. In 1993, there were 15 deaths with asthma as the cause; the youngest was 45 years old. Contact: Roberta Chevoya at 222-2812

- **Health Interview Survey**

This telephone-based survey includes 6,683 people from 2,580 households, interviewed in 1996. (See Jay S. Buechner, PhD, and William J. Waters, Jr., PhD, "Prevalence of Asthma in Rhode Island," *Medicine & Health/Rhode Island,* October, 1998.) Information was collected on demographics, social and economic characteristics, coverage for health care costs, and general and specific measures of health status. For those reporting asthma, respondents were asked whether they had been diagnosed by a physician. Information on activity limitations was also collected. Addresses are not available to researchers. Data is available by census tract.
Contact: Jana Hesser, PhD, at 222-2550

- **Hospital Discharges**

Discharges of patients staying in the hospital for three or more days must be reported to the Department of Health. Information is reported by census tract only, without addresses. Contact: Jay Buechner, PhD, at 222-2550

- **Rhode Island Kids Count Factbook**

Rhode Island Kids Count is expanding data collection on asthma. This year there will be a full indicator on asthma based on hospital discharge data reported to the Rhode Island Department of Health. Discharges will be tabulated by city and town for the state. Contact: Ann Marie Harrington at 351-9400

Robert Vanderslice, PhD, is Chief, Office of Environmental Health Risk Assessment, Rhode Island Department of Health.

Lynn Bibeault, MS, is Deputy Chief, Office of Environmental Health Risk Assessment, Rhode Island Department of Health.

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Upcoming Asthma Summit

RHODE ISLAND'S NEWLY-FORMED ASTHMA CARE AND ADVOCACY NETWORK plans to launch a spring 2000 asthma summit, where clinicians, researchers, patients and families can gather to share information. Spearheaded by the American Lung Association of Rhode Island, this summit draws sponsors from the state's health insurers, the State Department of Health, the Medical Society and the Rhode Island Public Health Association. For the Asthma Network, this summit wil be the first of various educational, clinical and research initiatives geared at improving the treatment of asthma in the state.

FOR ADDITIONAL INFORMATION on the summit and/or network, contact Tina Ragless by phone: (401) 421-6487, fax: (401) 331-5266, e-mail: alaofri@aol.com

The Asthmatic Worker and the Americans with Disabilities Act

Bruce I. Kogan, JD, LLM

The past forty years have witnessed the expansion of federal anti-discrimination laws into areas never envisioned in the early days of the civil rights movement in the 1950s and 60s. The Voting Rights and Civil Rights Acts of the mid-1960s eventually led to enactment of the Americans with Disabilities Act (A.D.A.) in 1990. Physicians play a significant role under this federal disability discrimination law (and its state human rights counterparts) since patients qualify for protection from employment and other discrimination only if they meet the statutory definition of having a "disability." Although nearly 15 million Americans have asthma or related chronic respiratory conditions, they may have difficulty establishing their entitlement to protection under the A.D.A. unless treating physicians understand their role in the disability legal process.

Abbreviations Used:
ADA Americans with Disabilities Act

The A.D.A. prohibits covered employers from engaging in discrimination against qualified individuals with a disability in regard to hiring, advancement, discharge, compensation, or other terms and conditions of employment. To be protected by this law, an individual must be both a "qualified individual" and must have a "disability" as these terms are defined under the act. To be a qualified individual with a disability, one must be able to perform the essential functions of the employment position, with or without reasonable accommodations. The term disability means that the individual has a physical or mental impairment that substantially limits one or more major life activities, or has a record of such an impairment, or is regarded by the employer as so impaired.

Regulations promulgated under the A.D.A. help flesh some of this language out in ways that should cover asthma or other chronic respiratory dis-

eases since the regulations define physical impairment to include any physiological disorder or condition affecting the respiratory system. The physical impairment must substantially limit one or more major life activities to amount to a disability, with "major life activities" defined to mean "functions such as caring for oneself, performing manual tasks, walking, seeing, hearing, speaking, breathing, learning, and working [emphasis added]."

Asthmatic workers who are exposed in the workplace to allergens, irritants, or other triggers of respiratory distress may expect that their employers are required by the A.D.A. or by provisions of the earlier Rehabilitation Act to provide them with reasonable accommodations to their disability. Unfortunately, employees who suffer from asthma have not always succeeded in receiving favorable treatment either from their employers or from the courts. In a series of recent federal court cases involving workplace exposure to either cigarette smoke, paint fumes, other chemical vapors, or just poor ventilation, the employees, more often then not, have been unsuccessful. The courts have denied relief for varied reasons, but in some instances the treating or diagnosing physician's report and recommendations as to accommodations might have been more helpful.

An asthmatic power plant employee whose exposure to stack gas, paint fumes, and smoke, had led to chemical bronchitis requested an allergen-free work environment in Cassidy v. Detroit Edison Co., 138 F. 3d 629 (6th Cir., 1998). The employer initially tried to accommodate the employee by transferring her to a different department, allowing her to use a breathing machine, and scheduling maintenance during her absence. These measures were insufficient to remedy her breathing difficulties. She eventually brought suit against the company for failure to reasonably accommodate her under the A.D.A. One of the physicians who examined the claimant reported that her condition remained dire with extremely poor prognosis and recommended that the claimant's work environment be neither hot nor extremely cold and "free of allergens as is reasonably possible." The court denied her request for relief holding that her "proposed accommodation for essentially an allergen-free workplace, which Defendant attempted to locate within the company, was simply too vague to reasonably inform Defendant of a reasonable accommodation, or was otherwise simply unavailable."

Although nearly 15 million Americans have asthma or related chronic respiratory conditions, they may have difficulty establishing their entitlement to protection under the A.D.A. unless treating physicians understand their role in the disability legal process.

Exposure to poor ventilation or even specific workplace irritants such as chemical fumes or cigarette smoke have also proven to be insufficient bases for relief under federal or state disability discrimination laws where the doctors' reports concluded that the asthmatic employee was disabled from working in particular locations, but not substantially limited in breathing or working generally. In the absence of a conclusion that the employee had an impairment that substantially limited him/her from breathing or working generally, some courts have been unwilling to classify the employee as disabled within the meaning of the A.D.A.

These cases and others place asthmatic workers and their physicians somewhat in a Catch-22. If the report finds that the employee is totally impaired from working as a result of the respiratory disease, then the employee will not be deemed to be qualified to perform the essential functions of his or her position. Unless the disabled employee is otherwise qualified to do the job with reasonable accommodations, there will be no relief under the A.D.A. If the employee is deemed disabled from performing the particular job only because of specific workplace exposure, then it may be difficult to craft an accommodation request that a court will enforce. Obviously, merely recommending that the employee be transferred to or provided with an allergen or irritant-free workplace is likely to be rejected as simply too vague.

The lesson of all of this is that the treating or diagnosing physician must address three separate concerns in the report. First, the report must set forth sufficient medical test results or other factual findings to support a conclusion that the patient suffers from asthma or other respiratory disease that substantially limits the patient's ability to breathe and/or work. Second, the report must address whether the physician believes that the patient is capable of performing the essential functions of the job with reasonable accommodations. In order to be able to do this, the doctor must inquire into the essential functions of the position and must address how the patient will be able to perform those functions. Finally, the report must attempt to prescribe, with as much specificity as possible, the particular accommodations that the employee requires from the employer to be able to do his or her job. Recommendations as to regular break periods, the furnishing of desk-top air purifiers, the establishment of no-smoking zones, the allowance of workplace use of peak flow meters, spirometers, or other breathing apparatus, and the eradication to the extent possible of unnecessary irritants from the workplace are all the type of specific accommodations that a court is likely to enforce.

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Trends in Asthma Morbidity and Mortality, Rhode Island 1988–1997

Jay S. Buechner, PhD

Several recent national studies have presented evidence that the prevalence of asthma and the utilization of medical services to treat asthma have been increasing over the past decade or longer, both among the population as a whole and among young persons.[1,2,3] In addition, asthma death rates have been increasing among young persons.[3] Previous analyses on Rhode Island data showed that asthma prevalence rates in the state were higher than national rates as of 1996 and that the number of hospital inpatient discharges with asthma reported as an additional diagnosis increased between 1990 and 1995.[4,5] This report presents trend data on asthma-related mortality and hospitalizations in Rhode Island for the ten-year period from 1988 through 1997.

Methods

The Rhode Island death certificate file covers all in-state deaths plus deaths of Rhode Island residents occurring out of state and includes information on the decedent's demographics, underlying cause of death, and, since 1989, other conditions contributing to death. Rhode Island residents with asthma as the underlying cause of death and with any mention of asthma on the death certificate were identified based on the code for asthma (493) in the International Classification of Diseases, 9th Revision (ICD-9). Data for 1996 and 1997 are preliminary, as out-of-state deaths were not available.

Similarly, the statewide hospital discharge file includes patient demographics, principal diagnosis and additional diagnoses. Rhode Island resident discharges with asthma as the principal diagnosis and with asthma as an additional diagnosis were identified based on the code for asthma (493) in the International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM). Data on out-of-state hospitalizations of Rhode Island residents were not available for this analysis.

Crude and age-specific mortality rates and discharge rates were calculated using state population estimates from the United States Bureau of the Census.[6] Rates were produced for individual years and on an average annual basis for the five-year periods 1998-1992 and 1993-1997.

Results

Over the ten-year period examined, there were a total of 137 deaths in Rhode Island with asthma reported as the underlying cause. The mortality rate varied between 0.91 deaths per 100,000 population in 1994 and 1.80 deaths per 100,000 in 1992. (Figure 1) There was no indication of increasing mortality; the annual average rate decreased by 17% from the period 1998-1992 (1.49 deaths per 100,000) to 1993-1997 (1.24 deaths per 100,000).

There was also no evidence of increase in the rate of deaths with any mention of asthma on the death certificate during the nine years for which such data were available. Annual mortality rates for this definition varied between 3.14 deaths per 100,000 in 1997 and 5.20 deaths per 100,000 in 1992. (Figure 1) The decrease in average annual mortality rate from 1989-1992 (4.53 per 100,000) to 1993-1997 (3.78 per 100,000) was 17%, similar to the decrease in the underlying cause rate.

The rate of hospital discharges of Rhode Island residents with a principal diagnosis of asthma varied between 155.9 discharges per 100,000 in 1997 and 191.2 per 100,000 in 1993. (Figure 2) Again, there was no indication of increasing utilization for this condition; over 1998-1992, the average annual rate was 173.6 per 100,000, compared to 174.7 during 1993-1997. However, the discharge rate for patients with an additional diagnosis of asthma increased substantially during the decade, from a low of 118.5 per 100,000 in 1988 to a high of 435.2 in 1997, nearly a four-fold increase.

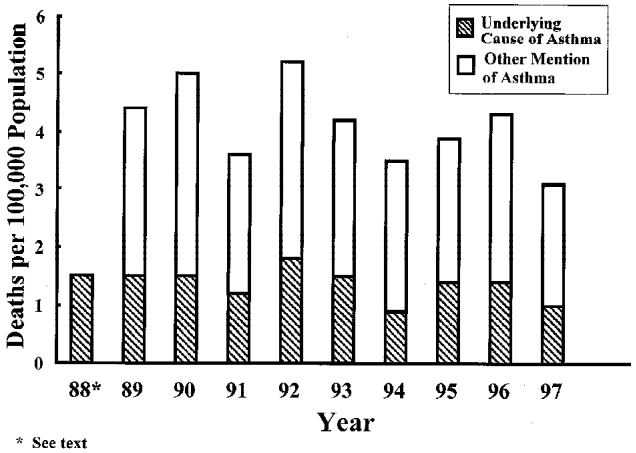

Figure 1. Asthma Mortality per 100,000 Population, by Year and Position of Asthma on the Death Certificate, Rhode Island, 1988 - 1997.

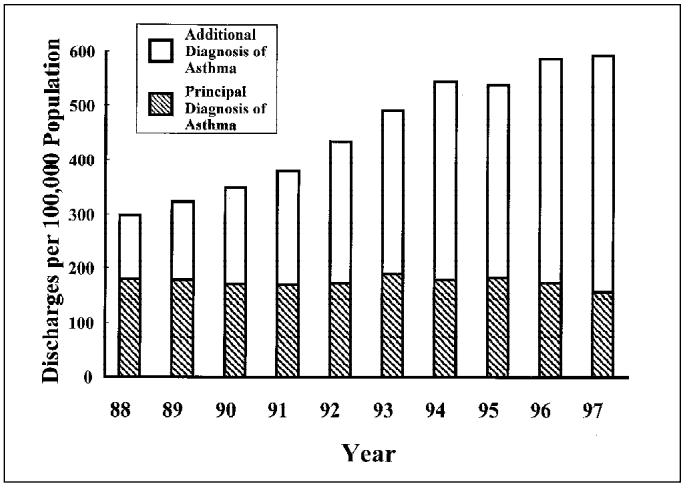

Figure 2. Hospital Discharges with Asthma per 100,000 Population, by Year and Position of Asthma Diagnosis, Rhode Island, 1988 - 1997.

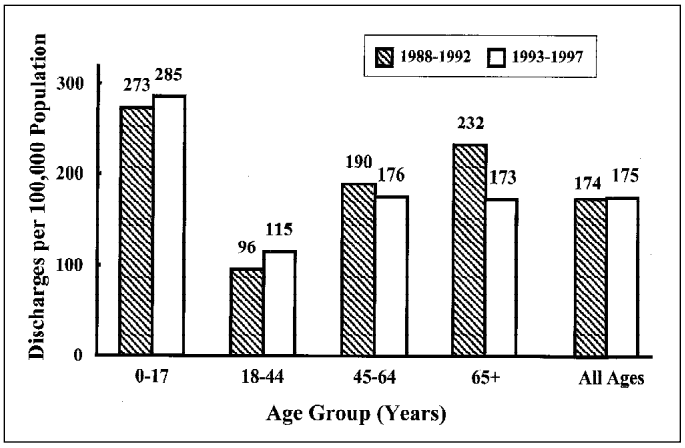

Figure 3. Hospital Discharges with Principal Diagnosis of Asthma per 100,000 Population, by Age Group and Grouped Years, Rhode Island, 1988-1992 and 1993-1997.

Although the overall discharge rate for patients with a principal diagnosis of asthma did not vary between 1988-1992 and 1993-1997, there was considerable variation in age-specific discharge rates. For the two younger age groups examined, ages 0 - 17 and ages 18 - 44, the discharge rate increased; among older persons the rate decreased, considerably (down 25%) for those ages 65 and older. (Figure 3) However, the rate of deaths with asthma as an underlying cause declined more greatly among younger persons (under age 45) than among older persons (ages 45 and older).

Discussion

Except for hospital discharges with an additional diagnosis of asthma, Rhode Island data show no evidence of an increasing burden of morbidity or mortality due to asthma. In fact, mortality rates, although based on small numbers of deaths, appear to have declined during the most recent decade for which data are available, especially among younger persons. The observed increase in hospital discharges with an additional diagnosis of asthma may be due to one or more of several possible effects, including the following: (1) increasing prevalence of asthma in the population, (2) increasing diagnosis of asthma by physicians, (3) increase in recognition of asthma as a complication for other conditions causing hospitalization, and (4) general increase in the number of additional diagnoses reported for hospital discharges in the state. Data are available only for the last-listed effect, and the observed increase can explain only a small portion of the increase in asthma-related hospitalizations. Examination of the other possible explanations will require additional information beyond what is currently available for the state.

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References

1. Mannino DM, Homa DM, Pertowski CA, et al. Surveillance for Asthma - United States, 1960-1995. *MMWR* 1998;47(SS-1):1-28.
2. Burt CW, Knapp DE. Ambulatory care visits for asthma: United States, 1993-1994. Advance data from vital and health statistics; no. 277. Hyattsville MD: National Center for Health Statistics..1996.
3. Centers for Disease Control. Asthma mortality and hospitalization among children and young adults - United States, 1980-1993. *MMWR* 1996;45:350-3
4. Buechner JS. Hospital discharges with asthma, 1991-1995. *Medicine & Health / Rhode Island* 1997;80:264-5.
5. Buechner JS. Prevalence of asthma in Rhode Island. *Medicine & Health / Rhode Island* 1998;81:333-4.
6. United States Bureau of the Census. State population estimates website: www.census.gov/population/www/estimates/statepop.html.

Pediatric Asthma Outpatient Case Presentation

Carla M. Martin, MD

Introduction

Jose (not his real name) is now a 37 month-old Latino male who had nearly fifteen hospital admissions and numerous urgent care and sick visits for asthma exacerbations during his first two years of life. The morbidity and mortality from asthma have been rising dramatically among urban children, with African-American and Latino children disproportionately affected. This case will address some of the factors health care providers have encountered in managing asthma. It also emphasizes the importance of multidisciplinary management of children with asthma and the socioeconomic variables that affect their care.

Birth history

Jose was born to a Spanish-speaking 19 year-old G2 P1-2 mother after an uncomplicated prenatal course and good prenatal care. She was Group B Strep positive and treated with a full course of ampicillin and cefazolin two and a half months prior to delivery.

The patient was born at 42 weeks by cesarean section secondary to failure to progress. Meconium was present and he was intubated and suctioned, given bag-valve-mask ventilation and blow by oxygen until given his heart rate, color and tone improved. The APGAR scores were 3 at 1 minute and 8 at 5 minutes. His birth weight was 4420 grams, birth length was 54 centimeters and head circumference was 37.25 centimeters. He was admitted to the Special Care Nursery for tachypnea.

Hospitalizations and asthma management

The patient became tachypneic several hours after delivery and was admitted for 2 days to the special care nursery and was ruled out for sepsis. He improved, was taken off antibiotics and went home with his mother.

The baby had been doing well at home, until 17 days of age when he became febrile and developed a cough. He was initially diagnosed with an otitis media and admitted the next day to the Pediatric Intensive Care Unit for respiratory distress. He was intubated during this admission and found to have Respiratory Synctial Virus bronchiolitis and pneumonia. He received his first nebulizer and IV steroid treatments, antibiotics and was discharged home on day 20 on prednisone and albuterol nebulizer treatments.

At 1.5 months of age, the patient was admitted again for pneumonia and RSV bronchiolitis. A murmur was noted during this admission and a cardiology evaluation including an echocardiogram was negative.

Following these admissions, the patient had approximately 13 more admissions for asthma exacerbations, the last one documented at 20 months of age. He also had approximately 15 urgent care, sick visits and follow-up visits for asthma, some of which led to admissions, and 11 emergency department visits for asthma exacerbations where he was not admitted. The patient also had several ED and urgent care visits for viral gastroenteritis and otitis media.

Abbreviations Used:

ED	emergency department
MDI	metered dose inhaler
PMD	primary medical doctor
RSV	respiratory synctial virus
VNA	Visiting Nurse Association

The patient's initial medical management consisted of albuterol nebulizer treatments. He would be given IV and then po steroids during and after his hospital admissions. Cromolyn sodium nebulizer treatments were added at approximately 9 months of age. When Jose was 11 months old, his mother was enrolled in the Pediatric Asthma Care and Education Program.

During an admission at 12 months of age, theophylline was added to his regimen. The pulmonary consult service noted that his mother was not administering his medicines correctly.

At 15 months of age, during his 12th hospital admission, Jose was started on beclomethasone MDI and continued on theophylline and his albuterol nebs. At 20 months of age, during an admission, the patient was taken off the theophylline and continued on the beclomethasone. Later that month, the theophylline was restarted during an admission. Several changes had been made to his regimen between his clinic visits. At age 21 months, the patient went to pulmonary clinic and was doing well. He was continued on the theophylline, changed from beclomethasone to flunisolide, and told to continue the inhalers. The providers had doubts about whether the mother was correctly administering the medications and arranged for a visiting nurse visit to ensure proper usage.

This regimen appeared to work well with minimal wheezing, and the patient was continued on it during his last documented pulmonary clinic visit, at age 22 months. Two weeks later, the patient had an urgent care visit for asthma exacerbation. He was continued on his medication regimen and started on prednisone. This was his last documented visit.

Family history

The patient's family history was significant for asthma on the maternal side including his grandmother, several uncles and aunts. His parents and brother, who was four years older, had no significant past medical history and did not have asthma or any other medical problems.

Feeding and development

Review of the patient's feeding at his well-child visits deemed it appropriate. The patient was noted to be growing in the 50th percentile for weight which dropped to the 25th and then the 15th percentile at 12 months. His height dropped from the 25th to the 10th percentile at approximately the same time. His development was otherwise appropriate and his immunizations were up to date.

Allergen exposure, poverty, RSV, health care access and improper use of medications all contributed to this patient's asthma morbidity.

Social history

The patient initially lived with both of his birth parents and a brother, who was 4 years older. The primary caregivers were his parents but he was also cared for by his maternal and paternal grandparents. During his first 15 months, the patient's parents separated and his mother started a new relationship. The patient's father decided to move back to Puerto Rico and pressured the patient's mother to return with him. It is unclear if there had been any physical abuse in the household while the father lived at home, but the mother told the resident physician during Jose's 15 month-visit that she had a restraining order against Jose's father.

Allergens

The VNA visited the patient's first home to evaluate possible environmental allergens. The apartment had cockroaches, rats and a wood burning stove. The parents denied smoking. The patient, his mother and brother moved to another apartment when the patient was 15 months old in an effort to avoid the allergens. The patient's brother, in daycare, often had upper respiratory infections.

Discussion

Jose's case exemplifies the issues surrounding asthma management in children. Allergen exposure, poverty, RSV, health care access and improper use of medications all contributed to this patient's asthma morbidity.

The patient was exposed to multiple allergens at home including cockroach droppings, dust mites, rat droppings and a wood burning stove. In addition to the environmental allergens, he was diagnosed with multiple upper and lower respiratory infections. Despite his mother's efforts to limit the allergens, the patient continued to have exacerbations. The patient may have benefited from a visit to the Allergy and Immunology Clinic to evaluate specific allergens contributing to his asthma. A sweat test to rule out cystic fibrosis was done and was negative.

Sociodemographic and psychosocial variables are just as important. There is a well-known association between asthma morbidity and poverty. The patient's mother was young and came from a low income Hispanic household. Her perception of her child's health may have affected her response to it. So may her mental health, her social supports and the stress of her relationship with the patient's father. She had a restraining order against the patient's father but it was not clear whether she or the child were being abused. Social worker notes did not appear to address these. These stressors most likely contributed to Jose's health and led his mother to apply for disability coverage since she spent so much time caring for him. Health care providers must assess and respond to both the children's and the parent's stressors.

Jose had two admissions for RSV bronchiolitis. Given the association between RSV and future development of asthma secondary to bronchial endothelial damage, this probably also predisposed him to his multiple exacerbations. His mother frequently gave him the wrong medication regimen at home, despite receiving asthma teaching at the well-child and pulmonary clinics, during his hospital admissions and from the asthma education project. This emphasizes the importance of repetition in asthma education, especially with patients whose parents are primarily non-English speaking and who have low levels of schooling.

Jose did have adequate access to health care but did not have a consistent primary care provider. Instead, he was seen by multiple doctors. This may be partly due to the frequent hospitalizations, when he would miss his clinic visits, and also to the fact that he would often be assigned to a new doctor after his admissions. He also saw different doctors during his emergency department and urgent care visits. His mother was rarely able to identify the patient's PMD. The fact that Jose dropped to a lower percentile for height and weight is troubling. Behavioral issues affected by his asthma such as eating, sleeping and gastrointestinal symptoms do not appear to have been adequately addressed. Unfortunately, Jose was lost to follow-up and his last visit at the outpatient clinic was at the age of 22 months. His mother may have moved to Puerto Rico with him or may have taken him to a different clinic. As healthcare providers, it is frustrating when our patients are lost to follow-up, especially with a patient such as Jose who requires close management.

Over the past few years, we have seen increasing rates of morbidity and mortality from asthma among urban youth. As health care providers, we must take on the huge responsibility of devoting more time to educating our patients and addressing the social issues affecting their health, despite the constraints and time limitations placed on us.

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CME Background Information

This CME activity is sponsored by Brown University School of Medicine.

Target Audience

This enduring material is designed for primary care physicians.

CME Objectives

After completing this CME activity, the primary care physician will be able to meet the following objectives:

1. The physician will know the public health arguments, for and against, making asthma a "reportable disease" to the Health Department.
2. The physician will have a management plan, by visit, for treating a patient newly diagnosed with asthma; including
   * patient instructions as to self-care- instructions on exercise, household irritants and precautions to take
   * referral names/numbers/web site for support groups, asthma-related organizations
   * instructions for a "daily diary"
3. The physician will understand the specific management problems associated with inner-city urban children (allergen exposure, poverty, parents' stressors, improper use of medications, truncated professional care).
4. The physician will understand the practical isssues for working with the schools: whom to contact, what those contact people and cannot do. S/he will know about SBHC (school-based health clinics) and COZs (Child Opportunity Zones).
5. The physician will know the legal provisions for smoke-free schools.
6. The physician will understand the indications for prescribing antileukotriene modifiers.
7. The physician will know key environmental irritants, and the resources to call for additional information.
8. The physician will know Rhode Island's legislation for indoor air quality in public places.
9. A physician will be able to discuss the issue of early-prescription of steroids, knowing the arguments for and against.
10. A physician will know the rights of the worker with asthma under the Americans with Disabilities Act.

Needs Assessment

The need for this educational activity was supported by the Robert Wood Johnson Cooperative Actions for Health Program, which agreed to fund the issue.

Acredditation Statement

Brown University School of Medicine is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to sponsor continuing medical education for physicians.

This activity has been planned and implemented in accordance with the Essentials and Standards of the Accreditation Council for Continuing Medical Education.

Credit Designation

Brown University School of Medicine designates this education activity for 2 hours in category 1 credit toward the AMA Physician's Recognition Award. Credit can be obtained by reading the issue and completing the quiz on pages 267-268. The estimated time for completion of this activity is 2 hours.

Date of Original Release

This issue was published in July 1999. This activity is eligible for CME credit through May 2000.

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Author Discloser

In the spirit of full disclosure and in compliance with all Accreditation Council for Continuing Medical Education Essentials, Standards, and guidelines, all authors for this CME activity have submitted full disclosure statements. There were no relationships to disclose. Specifically, no author received grant and/or research support, or honoraria, from a pharmaceutical company or a manufacturer of asthma-related equipment or devices.

Discussion of Investigational Information

The authors have stated there is no off-label or investigational use.

Acknowledgement

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To Obtain Credit

To obtain credit, please submit answer grid and $25 fee to Office of Continuing Medical Education, Brown University. Respondents must receive a score of 70 or higher for credit.

CME Questions

Choose one response.

1. Making asthma a reportable disease would most likely lead to:
   a. reduced childhood prevalence
   b. improved therapeutic interventions
   c. competing disease registries
   d. a better disease definition
   e. lower mortality rates

2. Asthma affects almost_____ million people in the United States.
   a. 5
   b. 10
   c. 15
   d. 20
   e. 25

3. Which of the following statements is true?
   a. Patient education is of little importance.
   b. Most patients correctly use their metered-dose inhalers.
   c. Few other diseases mimic asthma.
   d. Peak flow alone should determine medication changes.
   e. An open dialogue between the physician and the patient is essential for successful treatment.

4. The use of inhaled steroids in children:
   a. may cause growth reduction in prepubescent ages
   b. is not approved by the FDA
   c. has no efffect on the frequency of exacerbations
   d. is associated with increased mortality
   e. should be reserved for exercise-induced broncho spasm alone

5. Leukotriene cause bronchoconstriction, increased vascular permeability and one of the following:
   a. increased ciliary function
   b. increased mucus secretion
   c. decreased edema formation
   d. decreased neutrophil recruitment
   e. increased IgE levels

6. Which of the following statements is true:
   a. Smoking is only allowed in school administrative buildings.
   b. Child Opportunity Zones (COZs) link health and social services to schools.
   c. Asthmatic children should not exercise.
   d. Only nurses can adminster inhalers at school.
   e. Asthma management plans aren't useful for school-aged asthmatics.

7. Environmental contributory factors for asthma include:
   a. indoor air pollution (cooking stoves)
   b. viral infections
   c. parental smoking
   d. house dust mites
   e. all of the above

8. To ensure coverage under the Americans with Disabilities Act, physicians must document which of the following:
   a. work impairment due to asthma
   b. medical confirmation of disease
   c. ability to perform job with reasonable accommodations
   d. a. & b.
   e. b. & c.

9. Asthma mortality in children has been associated with
   a. allergen exposure
   b. poverty
   c. health care access
   d. all of the above
   e. none of the above

10. Since_____, Rhode Island has banned smoking in school settings.
    a. 1998
    b. 1968
    c. 1975
    d. 1992
    e. 1984

11. Montelukast (singular®) has been proven to:
    a. increase as needed beta agonist use
    b. increase noctural awakening
    c. decrease quality of life measures
    d. increase FEV_1, and morning/evening PEFR
    e. none of the above

12. Enforcement of the smoke-free school act:
    a. has been comprehensive in most schools
    b. requires parents to write to the RI Department of Health
    c. starts with the school administration, then the super intendent and the school committee, if necessary
    d. is supervised by the RI Attorney General
    e. is not necessary

13. Indoor air quality in schools is protected by:
    a. OSHA
    b. RI Department of Labor and Training
    c. Environmental Health Division of the RI Department of Health
    d. RI Department of Health and Education
    e. all of the above

14. Physicians can help their school-aged asthmatics by:
    a. requesting school nurses to develop a written asthma management plan with the patient
    b. ignoring school policies and protocols concerning medications
    c. not informing parents, or school nurses, of problems in management
    d. sharing asthma education materials with their schools
    e. discouraging physical activity in school

15. Environmental causes of asthma include:
    a. air pollution
    b. house dust mites
    c. cigarette smoke
    d. pollen
    e. fungi

16. Smoking in the work place:
    a. is permitted in supermarkets, medical offices, and laundries
    b. is regulated by the Department of Health
    c. is allowed if accommodations are made for non-smokers
    d. none of the above
    e. all of the above

17. Rhode Island asthma data for the period 1988-1997 have shown:
    a. decreased overall asthma mortality
    b. increased overall asthma mortality
    c. decreased hospital discharges with an additional diagnosis of asthma
    d. increased overall hospital discharge rate for patients with a principal diagnosis of asthma
    e. a and c

18. Asthma can be confused with other disease states such as:
    a. foreign body obstruction
    b. panic disorder
    c. chronic tracheitis
    d. deconditioning
    e. all of the above

CME Registration Form

Circle one response for each question.

1.	a	b	c	d	e
2.	a	b	c	d	e
3.	a	b	c	d	e
4.	a	b	c	d	e
5.	a	b	c	d	e
6.	a	b	c	d	e
7.	a	b	c	d	e
8.	a	b	c	d	e
9.	a	b	c	d	e
10.	a	b	c	d	e
11.	a	b	c	d	e
12.	a	b	c	d	e
13.	a	b	c	d	e
14.	a	b	c	d	e
15.	a	b	c	d	e
16.	a	b	c	d	e
17.	a	b	c	d	e
18.	a	b	c	d	e

Print or type

Name _____

Address _____

_____

City, State, Zip _____

Phone ( ) _____

Fax( ) _____

❑ Hospital ❑ Private Practice ❑ Resident ❑ Intern

❑ Other _____

Deadline for submission

For credit to be received, please mail your registration with $25 fee, to: Office of Continuing Medical Education, Brown University School of Medicine, Box G-A2, Providence, RI 02912. Submit your answers no later than May 31, 2000.

Keep a copy for your files.

Retain a copy of your answers and compare them with the correct answers, which will be made available upon request, and receipt of submission requirements.

Evaluation

Please evaluate the effectiveness of the CME activity on a scale of 1 to 5 (1 being poor; 5 being excellent) by circling your choice.

	Poor				Excellent
1. Overall quality of this CME activity	1	2	3	4	5
2. Content	1	2	3	4	5
3. Format	1	2	3	4	5
4. Faculty	1	2	3	4	5
5. Achievement of educational objectives:					
*Know the public health arguments, for and against, making asthma a "reportable disease" to the Health Department.	1	2	3	4	5
*Have a management plan, by visit, for treating a patient newly diagnosed with asthma.	1	2	3	4	5
*Understand the specific management problems associated with inner-city urban children.	1	2	3	4	5
*Understand the practical isssues for working with the schools: whom to contact, what those contact people and cannot do.	1	2	3	4	5
*Know the legal provisions for smoke-free schools.	1	2	3	4	5
*Understand the indications for prescribing leukotriene modifiers.	1	2	3	4	5
*Know key environmental irritants, and the resources to call for additional information.	1	2	3	4	5
*Know Rhode Island's legislation for indoor air quality in public places.	1	2	3	4	5
*Discuss the issue of early-prescription of steroids, knowing the arguments for and against.	1	2	3	4	5
*Know the rights of the worker with asthma under the Americans with Disabilities Act.	1	2	3	4	5
6. This CME activity provided a balanced, scientifically rigorous presentation of therapeutic options related to the topic, without commercial bias.	1	2	3	4	5

Please comment on the impact that this CME activity might have on your management of patients.

_____

_____

_____

Additional comments and/or suggested topics for future CME activities.

_____

_____

Rhode Island
Quality Partners, Inc.

Adult Immunization: Influenza and Pneumonia

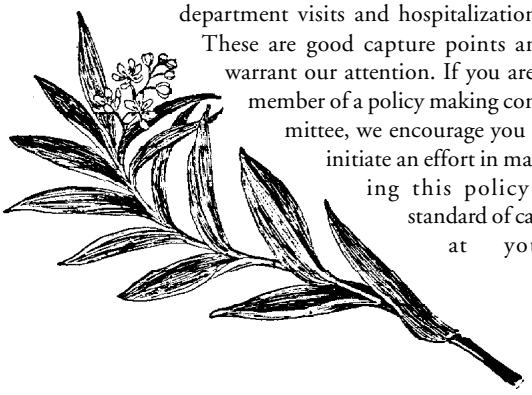
Raymond Maxim, MD

Once again it is time to prepare for the upcoming flu season which means that at Rhode Island Quality Partners (RIQP) we are also gearing up for our immunization program as well. Last year, we worked very closely with the Ocean State Adult Immunization Coalition to provide clinicians and beneficiaries with information regarding the influenza and pneumococcal vaccines. Medicare beneficiaries were encouraged to get both the flu and pneumococcal vaccines through a media campaign that depicted a blue hospital sign with a slogan * Wouldn*t you rather sleep in your own bed this winter?*. This generated significant interest among beneficiaries. The goal was to have patients ask their doctors for the vaccines instead of the providers having to remind patients of the need for immunization. We sent providers billing and vaccine purchasing information to help them prepare for the upcoming fall influenza season.

Last year, in addition to our usual informational mailings we did something different. We sent to physicians listed as Internal Medicine, Family Practice, General Practice, and Geriatrics the rates for pneumococcal vaccine in beneficiaries that we could identify as one of their patients. The results were both disturbing and encouraging. The discouraging information was that the rates averaged less than 20% for patients having received a pneumococcal vaccine in the previous 8 years. The few practitioners with high rates had very small numbers of patients. As a rule, the primary care practitioners performed very poorly in administering an effective preventive service. I must admit my own practice did not perform any better than others. My personal rate for pneumococcal immunizations was only 26%. As you can imagine, this was extremely disappointing to me and my staff. With that information we chose to change the practice to include standing orders for both influenza and pneumococcal vaccinations. These standing orders are not limited to those patients that have appointments. Anytime a patient comes to the office whether it be for a billing problem or to ask for a prescription refill they are offered an appropriate vaccine in order to capture every immunization opportunity.

The good news is that the response from other practitioners was similar to my own. I received letters and E-mail from colleagues expressing their surprise and announcing their determination to review their practice patterns in order to improve their performance. This is an example of benchmarking and how it can help physicians improve their performance. This type of feedback is essential but can be expensive and time consuming for an individual practice to gather. RIQP will be providing similar information about influenza and pneumococcal vaccines this year. We hope that you will find this information helpful in caring for your patients.

To improve performance as a whole for the state of Rhode Island from the current level of 50% of eligible Medicare beneficiaries receiving immunization for influenza we must address those populations that are at risk and are difficult to reach. Suggestions from other physicians have been standing orders for immunizations in the office that make it routine to inquire about immunization status. For those of you who are medical directors of nursing facilities, consider using standing orders on admission for pneumococcal immunization and seasonal orders for flu vaccine. With the implementation of the prospective payment system, it is in the institutions* best interests to be proactive in preventing hospitalizations. Standing orders that have been used successfully in other institutions are available and I would be happy to share those with you. Other opportunities pointed out by physicians that have contacted me are emergency department visits and hospitalizations. These are good capture points and warrant our attention. If you are a member of a policy making committee, we encourage you to initiate an effort in making this policy a standard of care at your



hospital. There are many hospitals outside the state of Rhode Island that have had successful programs and at least one hospital in Rhode Island who has begun a similar program.

As usual, I seek feedback from you regarding these issues or any others pertaining to the quality of care given our Medicare beneficiaries.

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SEQUELAE TO THIS ISSUE: WORKSHOPS

The Robert Wood Johnson CAHP grant has underwritten not only this issue of *Medicine & Health/Rhode Island*, but post-issue workshops. That post-issue money will go towards grand rounds in hospitals, inservice sessions for school nurses, and workshops in inner-city schools. For more information, contact Celia Gomes-McGillivray, MPH, past president of the Rhode Island Public Health Association, phone: 459-5784; e-mail: cgm@ids.net.

Vital Statistics

Rhode Island Department of Health
Patricia A. Nolan, MD, MPH, Director of Health

Edited by Roberta A. Chevoya

Rhode Island Monthly Vital Statistics Report

Provisional Occurrence Data from the Division of Vital Records

Underlying Cause of Death	Reporting Period: July 1998		12 Months Ending with July 1998			
	Number	(a)	Number	(a)	Rates (b)	YPLL (c)
Diseases of the Heart	226		3,131		316.2	3,965.0
Malignant Neoplasms	213		2,520		254.5	6,873.5**
Cerebrovascular Diseases	50		655		66.1	739.5
Injuries (Accident/Suicide/Homicide)	39		346		34.9	7,065.5**
COPD	34		464		46.9	350.0

Vital Events	Reporting Period: January 1999	12 Months Ending with January 1999	
	Number	Number	Rates
Live Births	914	13,254	13.4*
Deaths	973	9,741	9.8*
Infant Deaths	(6)	(97)	7.3#
Neonatal deaths	(4)	(73)	5.5#
Marriages	261	7,480	7.6*
Divorces	220	3,112	3.1*
Induced Terminations	509	4,616	348.3#
Spontaneous Fetal Deaths	10	837	63.2#
Under 20 weeks gestation	(1)	(750)	56.6#
20+ weeks gestation	(9)	(87)	6.6#

* Rates per 1,000 estimated population # Rates per 1,000 live births

**Excludes one death of unknown age

(a) Cause of death statistics were derived from the underlying cause of death reported by physicians on death certificates.

(b) Rates per 100,000 estimated population of 990,225

(c) Years of Potential Life Lost (YPLL)

Note: Totals represent vital events which occurred in Rhode Island for the reporting periods listed above. Monthly provisional totals should be analyzed with caution because the numbers may be small and subject to seasonal variation.

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Heritage: Asthma Reports

January 1900

In "Some Observations On Bright's Disease," Herbert Terry, MD, relayed the observations of Dr. Whitfield, who cautioned colleagues to check patients' urine - both when they suspected renal insufficiency, and when they didn't. In two cases asthma was symptomatic of Bright's Disease. A painter who had come to [Dr. Whitfield's] office had difficulty breathing and thought he had a cold. Within the year the painter died. In another case, a carpenter had "bronchitis of a rather long duration, and with more than the usual bronchial rasp." Checking the carpenter's urine, Dr. Whitfield diagnosed Bright's disease. [Dr. Whitfield also linked Bright's disease to ulcers, nosebleeds, diarhhea, cirrhosis, pleurisy, epilepsy, migraine, and insanity.]

January 1934

In "The Rhinological Treatment of Asthma," Jay N. Fishbein, MD, declared, "It is only of comparatively recent times that the nose and throat have been seriously considered as a potential factor in the causation of asthma." Fifty years ago Dr. Voltolini had reported curing asthma after a nasal operation - spurring "rhinologists everywhere" into "rushing blindly into nasal surgery as a cure-all for bronchial asthma." From Fishbein's vantage, this enthusiasm "doomed Voltolini's discovery." A few patients emerged cured; many emerged worse, after a "needless sacrifice of intra-nasal tissue."

Other advances: Dr. James Adam (Glasgow, 1900) posited a dual causation: a toxin combined with a lesion in the respiratory tract (generally the nose) would lead to asthma. Dr. Burton Hazeltine (Chicago, 1900) posited that asthma was an anaphylactic effect of an allergy. The English surgeon Sir Dundas Grant (1927) posited an "asthma-genetic zone" in the ethmoid region of susceptible people.

Empirically, a 1929 study at the University of Pennsylvania of 200 cases showed that 173 had positive sinus disease.

Dr. Fishbein argued against radical surgery ("nasal and sinus operations should not be performed primarily for the cure of asthma"). He urged physicians to wash away nasal secretions ("tamponage augmented by diathermy"), suggesting colloidal silver Dowling tampons. The patient would wear fastened to his forehead (by a letter-carrier strap) a tin block with strips of diathermy tape attached to a 2' by 8' strip of rubber. If the patient was hyper-sensitive to dust or food, the physician should desensitize the patient. If no hyper-senstivity was found, the physician should initiate non-specific (Protein shock) treatment - the parenteral injection of a non-specific protein. Dr. Fishbein used a variety of vaccines (typhoid, Colon bac, Van Cotts combined Bacterial Vaccine, Sherman's Vaccine, Milk Injections).

Of 170 patients (ages 5 to 60+), 42 had complete relief with this treatment. As for etiology, 128 patients had a relative with hay fever or asthma; 119 themselves had hay fever. In 84% of cases, Dr. Fishbein found a nasal pathology; in 47%, an infection of the ethnoid sinuses.

March 1934

In "The Specific Treatment of Asthma in Children," William P. Buffum, MD, discussed the "offending substance" - an inhaled (pollen, animal dander, dust) or ingested atopen. He urged colleagues to test patients, then remove the offending substance. He conceded, though, the difficulty of this "sort of shot-gun" approach of trying different exclusions, documenting sensitivity, then administering vaccines. Many patients would show no one clear sensitivity, particularly "the small group of malnourished children with severe asthma."

He isolated house dust (identified in 1922 by Cooke as an atopen) as a key irritant: "half of all asthmatics are sensitive in some degree by skin test to a preparation of house dust." Dr. Buffum injected a stock vaccine for house dust intravenously in 21 children; 11 improved. Conceding the difficulty of revamping a child's environment, Dr. Buffum occasionally recommended the family move. "One form of treatment which is useful occasionally, especially in severe cases, is a change of residence...if the patient moves, he will be better."

In "Asthma Study in Children," Reuben Bates, MD, and Stanley Freedman, MD, reported on 108 patients seen in the Children's Asthma Clinic of Rhode Island Hospital, 1930-34. The children, ages 3- 13, had suffered from 6 months to 11 years (the average was 3.5 years). Thirty-two percent had a history of infantile eczema; 59%, a history of atopy.

The authors listed common triggers: cat hair, rabbit hair, chicken feathers, June grass, orchard grass, ragweed, egg yolk, egg white, tomatoes, strawberries, salmon, house dust. As for etiology, they linked asthma to a variey of diseases: pertusses, measles, scarlet fever, pneumonia, influenza. As for treatment, they advocated tonsillectomy, even though they couldn't explain why it worked. "Why this surgical operation benefits asthmatics we are unable to explain, unless it is due to non-specific shock which temporarily benefits the allergic state."